The

Nalco #71
PAPER MILL
ANTIFOAM
CONTROLS foam and bubble formation over wide pH range—4.0 to 9.5!
ELIMINATES bubble formation on wires.
EASY to mix and feed.
NO EFFECT on other materials in the furnish.
ECONOMICAL—Average cost less than 15¢ PER TON of paper produced.

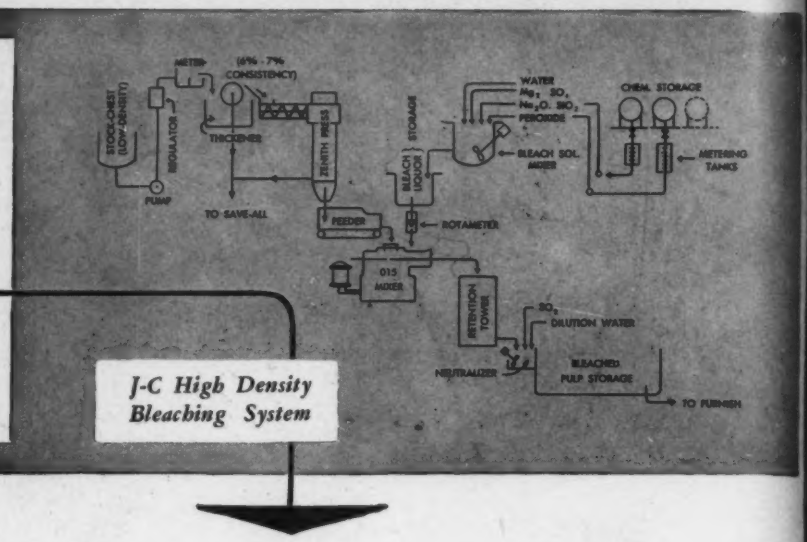
NALCO 71 not only positively eliminates foam and bubble formation in paper machine systems without affecting the furnish, but it also *stays in the water.* This means that remarkably small dosages of 71 efficiently prevent foam overflows, wadding, uneven caliper and other foam difficulties. Churning of Jordans, action of stock pumps and the flow of stock—the very things that cause foaming in untreated systems—all promote better action of Nalco 71!

Complete information on Nalco 71—and on other Nalco Chemicals for paper manufacturing use will be furnished upon request. Write today for prompt action on a permanent solution for your foaming problems.

NATIONAL ALUMINATE CORPORATION
6232 West 66th Place
Chicago 38, Illinois
Canadian inquiries should be addressed to Alchem Limited, Burlington, Ontario, Canada

THE SYSTEM
Serving the Paper Industry through Practical Applied Science

Jackson and Church — HIGH DENSITY SYSTEM

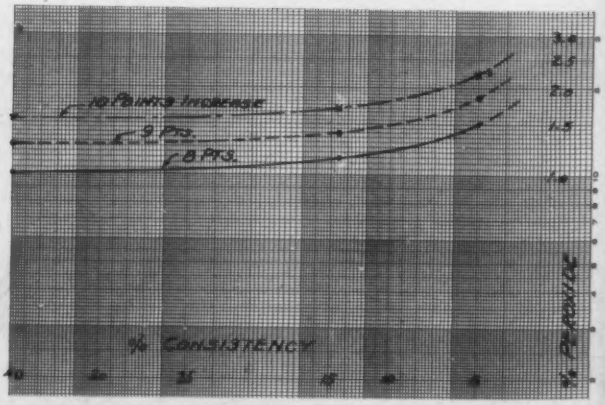


J-C High Density Bleaching System

SAVES 1/3 OF CHEMICAL COSTS

Recent tests performed under actual mill conditions proved savings of 12.8 pounds of bleach per ton of *groundwood* pulp. To a 100-ton plant this will mean a saving of 1,280 pounds of bleach in one day's operation by the High Density System, *or a saving in excess of $100,000 in a year.* Benefits from high density bleaching of sulphite pulp are comparatively greater.

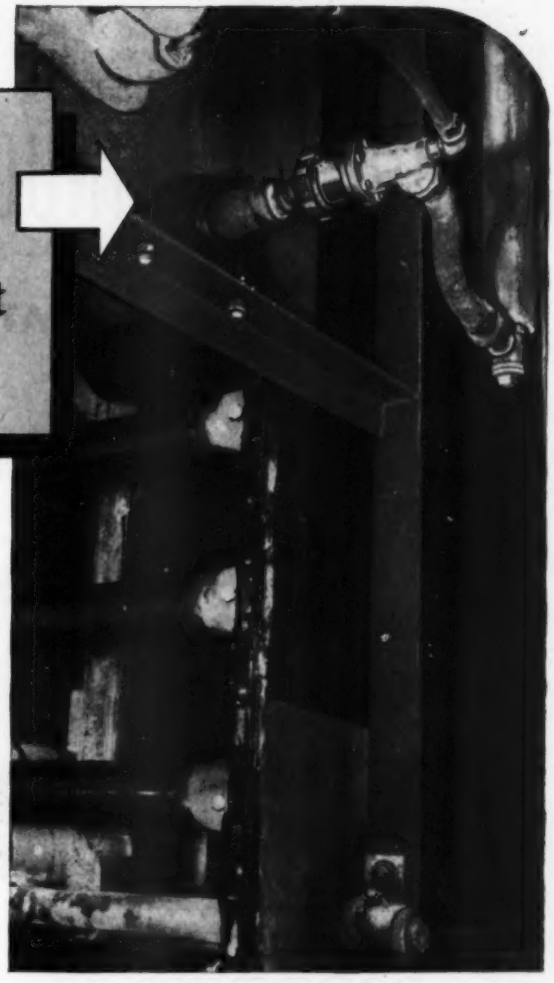
The Jackson & Church High Density System incorporates the J-C Zenith Press and J-C Shredder Mixer because of their ability to handle high consistencies. Pulp mills are now able to realize substantial savings by changing from low density with its higher bleach costs.



For additional information write Dept. P.I.

JACKSON & CHURCH COMPANY · SAGINAW, MICHIGAN

"Barco Revolving Joints give us the PERFORMANCE we want on paper coating rolls!"

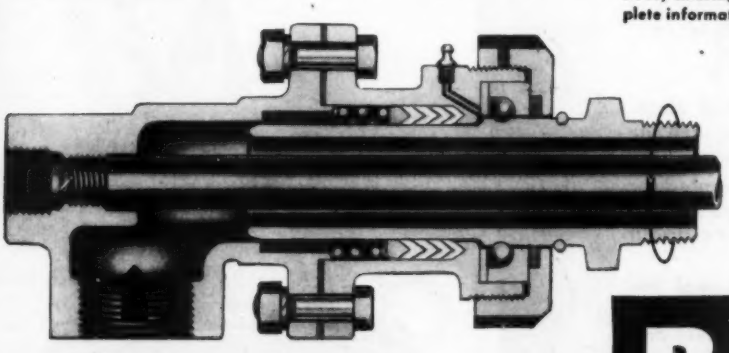


The above picture shows one of the Barco joints used by the Lloyd A. Fry Roofing Co., Summit, Ill., on a paper coating roll. For complete information on Barco Revolving Joints, send for Bulletin 300.

Says CHIEF ENGINEER
Francis Nelson of
Lloyd A. Fry Roofing Co.,
Summit, Illinois

■ Operating engineers throughout the country are reporting the benefits they receive from Barco's new *improved* Type IBR Revolving Joints. These are benefits that come from the *correctness* of Barco's design. There is minimum increase in torque (friction) under increased steam pressure—thanks to Barco's exclusive "CTR" V-type seal rings and ball bearings. Also note the wide spacing between bearings which holds bearing loads and wear to a minimum.

Barco builds a complete line of standard revolving joints in sizes ranging from ½" to 2" and special in sizes to 5". Pressures to 250 psi, steam, or 1000 psi, hydraulic. Speeds to 2500 rpm. *Barco Engineers are at your service; ask for recommendations.*



- Better Temperature Control where steam is used for heating rolls, due to better circulation.
- Free-Floating, Low Torque Installations.
- Up to 50% Power Savings.
- Exclusive "CTR" V-Type Seal Rings—*chemically inert.*
- Ability to Withstand Vibration and Hard Usage.
- Low Maintenance; No Adjusting. Holds seal running or standing.

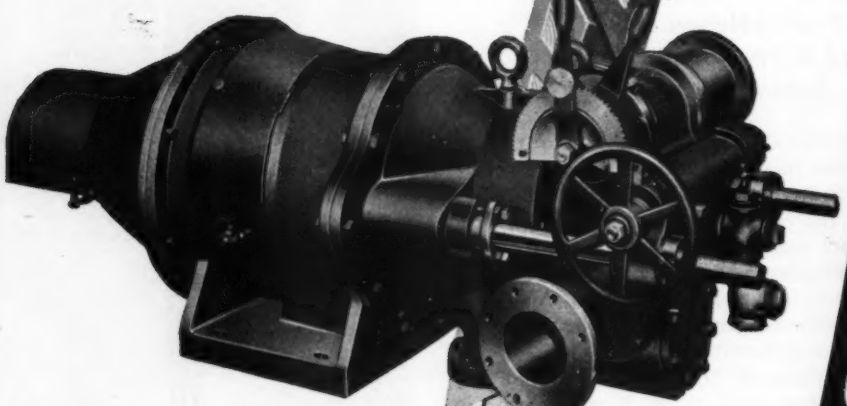
BARCO MANUFACTURING CO.
1826 H Winnemac Ave., Chicago 40, Illinois
In Canada: The Holden Co., Ltd.

BARCO *Revolving* **JOINTS**
For Paper Machine Dryers, Calenders, Paper Converting Equipment

ONE CONTINUOUS OPERATION

COMBINES BEATING and REFINING

SAVES SPACE • POWER • LABOR • MAINTENANCE



MORDEN "STOCK-MAKER"

The "Stock-Maker" combines the best time-proven principles of beating and refining into one compact, versatile and rugged unit, using...

1. **360° of bed plate shell (floating mounted for uniform pressure on all bars) surrounding a beater-roll type of rotor for the most efficient treatment.**
2. **Opposing internal flow pressures seal the stock between the treating elements and hold the fiber on the bar surfaces for complete and uniform treatment.**
3. **Optional internal blending or recirculation of a portion of the fibers for varying the individual fiber treatment on grades where this is advantageous.**

The simplicity, efficiency and advantages of these and other distinctive "Stock-Maker" features are proven by years of mill experience with hundreds of "Stock-Maker" installations on all types of pulps and grades of paper.

May we assist you with your beating and refining? Let us know your requirements.

SLUSH-MAKER

MORDEN
Machines Company

STOCK-MAKER

ORBETT BUILDING
ORTLAND 4, OREGON

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 34 • NUMBER 4 • JULY, 1952

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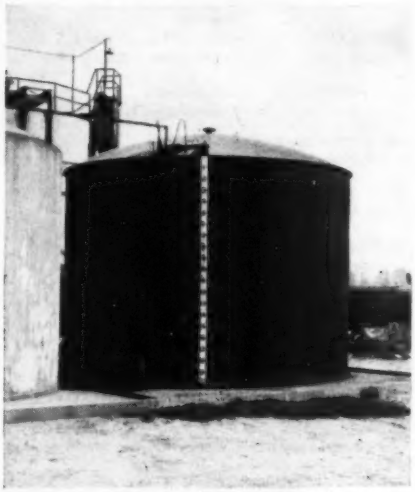
SOUTHERN EXPANSION

to keep pace with demands

Above: General view showing construction during expansion program at St. Regis Paper Company's Cantonment, Florida plant.

Left: Three 30-ft. diam. by 20-ft. liquor tanks and a 20-ft. diam. by 35-ft. foam tank.



Above: 30 ft. diam. by 20 ft. weak liquor tank built by Chicago Bridge & Iron Company for the St. Regis Paper Company at Cantonment, Florida.

THE pulp and paper industry in the South has been forced to expand rapidly to keep up with the ever-increasing demand for its products. One of the latest expansion programs inaugurated is that of the St. Regis Paper Company at Cantonment, Florida.

Structures built by Chicago Bridge & Iron Company in the St. Regis program include seven new digesters, 10 ft. 6 in. in diam. by 40 ft. high; a blow tank, 24 ft. in diam.; three 30 ft. diam. by 20 ft. liquor tanks; a 20 ft. diam. by 35 ft. foam tank; a Horton accumulator, 20 ft. in diam.; various stacks and other steel plate equipment such as hot water tanks, surge tanks and sump tanks.

Our facilities for designing, fabricating and erecting steel plate structures are complete. Four large plants in Birmingham, Chicago, Salt Lake City and Greenville, Pa. are strategically located to provide efficient service. Write our nearest office for complete information.

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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA. In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

GET THIS MAN'S ADVICE ON MAINTENANCE PAINTING PROBLEMS. HE OFFERS YOU MILLIONS OF DOLLARS' WORTH OF EXPERIENCE!

since 1883

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heavy-duty

MAINTENANCE PAINTS

Your Tropical man is a specialist in the selection and application of *heavy-duty* maintenance paints. For specific "problem jobs", he can advise on the type of paint, the amount to use and how it should be applied, based on the pooled experience of our nation-wide organization. This specialized attention is the foundation of Tropical's 69-year success in the development, manufacture and distribution of *heavy-duty* maintenance paints. This, too, is the reason why Tropical fresh-mixed paints have a national reputation for outstanding durability on the toughest maintenance applications. Get the benefits this special experience can bring you. Your letterhead request brings this Tropical specialist to your door. Write us today!

Since 1883

HEAVY-DUTY MAINTENANCE PAINTS

TROPICAL®

SUBSIDIARY OF PARKER RUST PROOF COMPANY

MAKERS OF Bonderite QUALITY CORROSION RESISTANT

MANY PAPER MILLS HAVE PROVED TROPICAL BETTER FOR "PROBLEM" SURFACES!

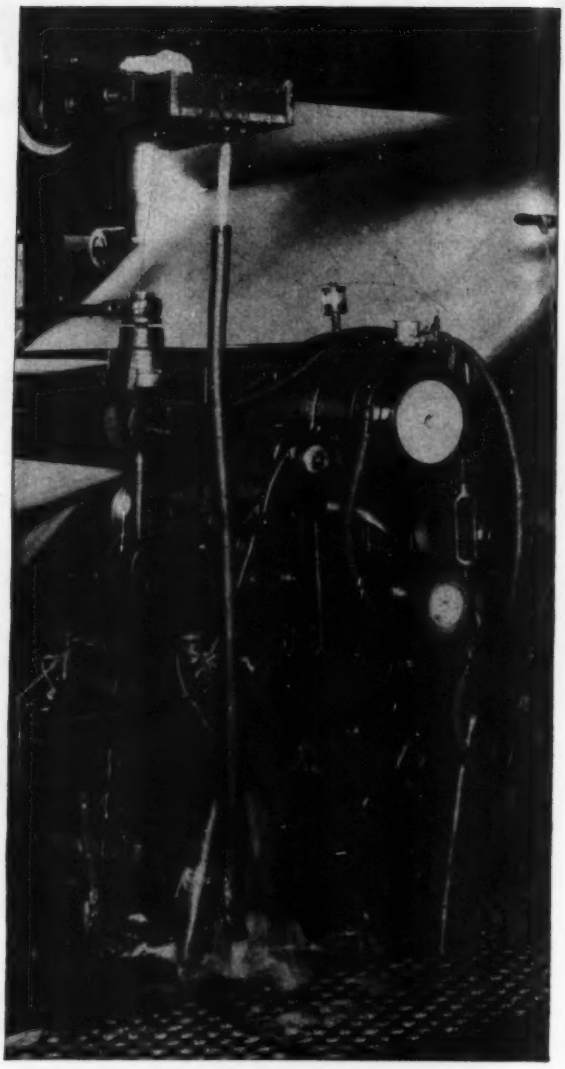
On many "problem" surfaces, where ordinary maintenance paints quickly deteriorate, Tropical paints give *heavy-duty* protection and lasting service. On pulp tanks and paper beaters, on machinery, wood, metal and masonry surfaces—wherever acids, fumes and moisture call for extra resistance in the paint finish hundreds of paper mills use Tropical!

•

FREE! Send for your copy of the "Industrial" Paint Index"—a quick, convenient reference chart for a multitude of maintenance paint applications!

THE TROPICAL PAINT & OIL COMPANY • 1116-1276 West 70th St., Cleveland 2, Ohio

How WET should a felt be?



All papermakers' felts are what scientists call "hygroscopic"—they soak up a lot of water which they imprison within themselves. As a practical paper manufacturer you are not greatly concerned with this imprisoned water. Your task is to get rid of the free water that is squeezed out of the sheet by the nip of the press.

Hamilton Felts do just that. The pattern of the weave, the number, shape and size of the open spaces between threads, the way they are woven, shrunk, fulled and napped—everything about Hamilton Felts contributes something to make them last longer, run faster and improve the finish of the paper or board that is formed upon them....

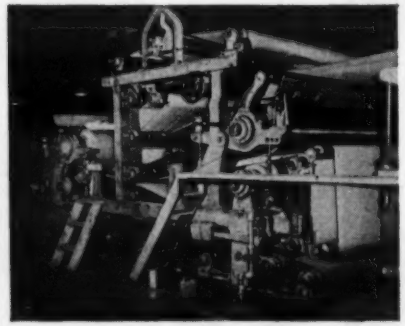
Hamilton Felts

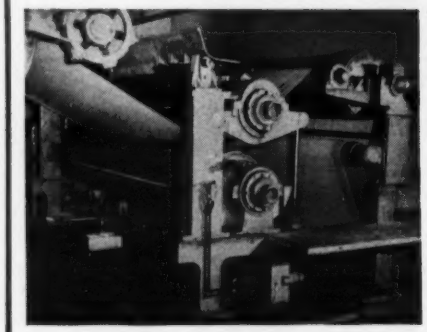
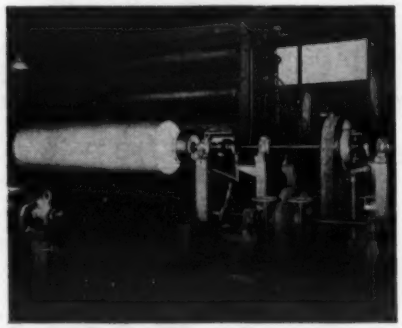
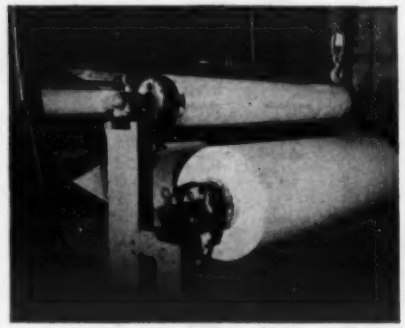
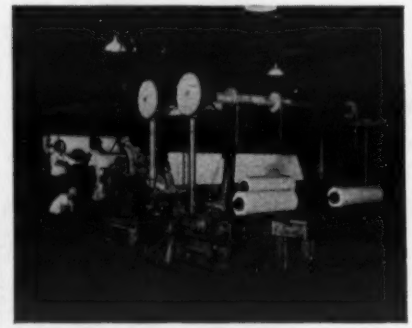
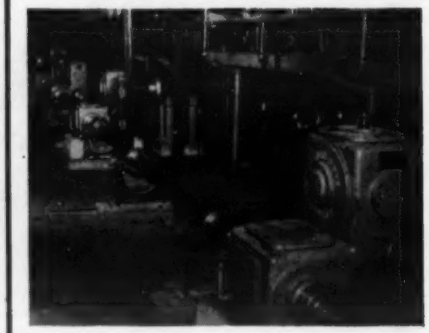
...The important question is not "how wet should the felt be?" It is "how dry will the felt make the sheet?"

MIAMI WOOLEN MILLS

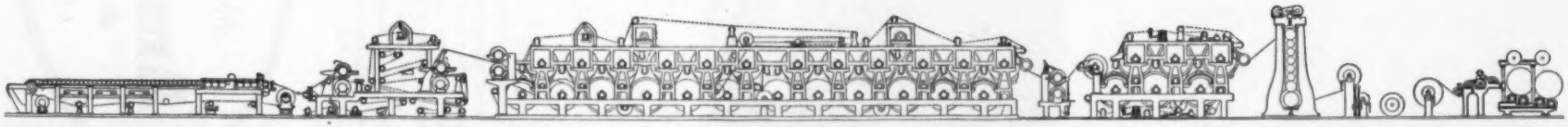
Established 1858

SHULER & BENNINGHOFEN, HAMILTON, OHIO

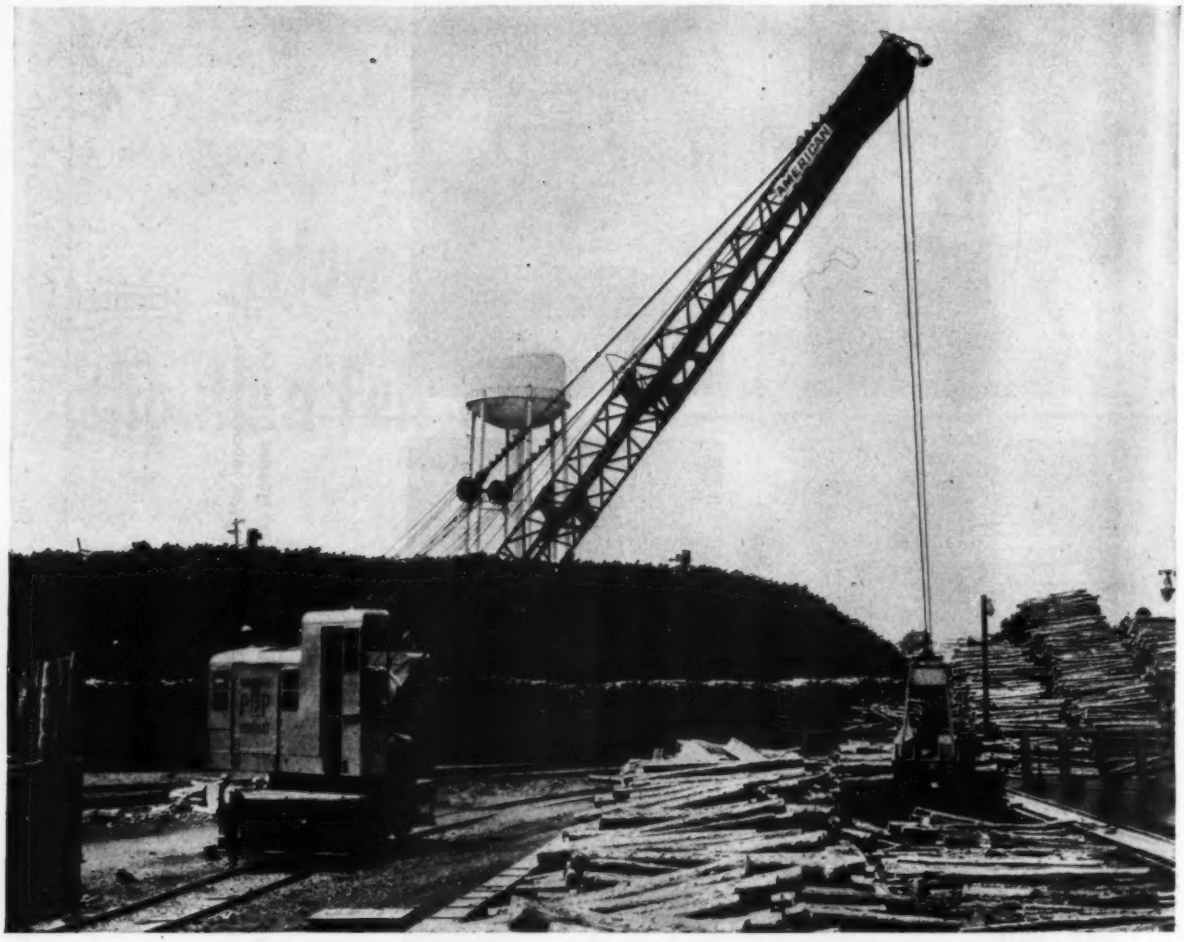


Latest Moore & White Fourdrinier machine with 136" wire operating on specialty grades at Hopper Paper Co., Taylorville, Ill. Above views show various machine sections and Moore & White Syco-type machine drive.



The MOORE & WHITE Company 15TH STREET AND LEHIGH AVENUE PHILADELPHIA 32 PA. • CUSTOM-BUILT MACHINES FOR PAPER MAKERS



Winner and still champion in the pulpwood handling field

Can you think of a tougher materials-handling job than storing and handling pulpwood? Here, your yard superintendent must unload his cars at a high-speed clip . . . and stack the wood to dizzy heights, to save ground space . . . and service a storage yard immense in area . . . and yet keep his cost per ton down to rock bottom.

In view of these facts, it is a wonderful tribute to American Locomotive Cranes that they are such great favorites in the nation's pulp and paper mills. Today, as for many years past, they are the No. 1 choice of the industry.

The reasons are clear and compelling. American Locomotive Cranes need only a one-man "crew". They can travel great distances at top speed while swinging, booming and lifting simultaneously. Maintenance costs have been cut most remarkably . . . and "down" time has almost completely vanished.

Why not compare your present pulpwood handling costs with the records of the new American Diesels and DiesELectrics. We'll be glad to furnish facts and figures for your study.

2608

Modernize...economize...with

American Hoist
& Derrick Company
ST. PAUL 1, MINNESOTA

For the BIG PRODUCTION jobs of industry...

AMERICAN LOCOMOTIVE CRANES

pre-beating

SALES GRADE PULPS

Today a number of mills are making and shipping pulps pre-beaten with Sutherlands. These pulps are cleaner, show better mullen and tear characteristics, and require considerably less power for subsequent beating than regular pulps.

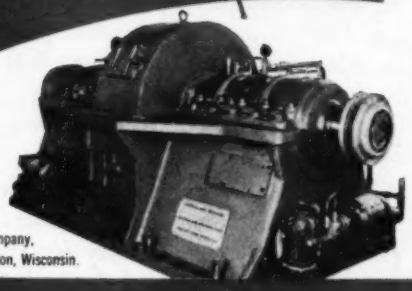
ADVANTAGES

TO PRODUCER

1. Improved pulp quality at low cost . . . produces brighter, cleaner pulp.
2. Easy control of pulp characteristics through varying the degree of pre-beating.
3. Better formation with more uniform drying.
4. Pre-beating results in savings to customer and greater marketability.

TO PURCHASER

1. Substantial power savings.
2. Ability to use greater quantities of hard-to-beat Southern and Western pulps, with present equipment.
3. Pulps can be adjusted to meet your specific needs by control of the pre-beating process.



Manufactured in the United States by Valley Iron Works Company, Appleton, Wisconsin.

You should investigate this process and determine, for yourself, the advantages to your mill. Complete technical data sent on request.

SUTHERLAND

continuous beating systems

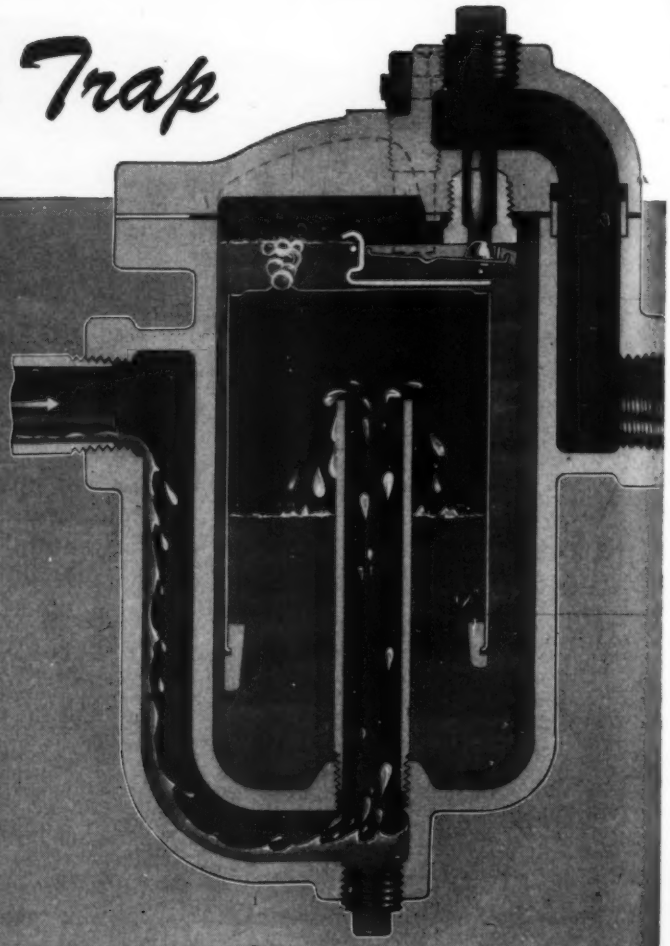
Designed, Engineered, Serviced

by SUTHERLAND REFINER CORPORATION

TRENTON 8, N. J.

This Steam Trap

MEETS THE REQUIREMENTS of Paper Machine Drainage



1. FAST VENTING OF AIR

2. LOW MAINTENANCE

STEAM traps haven't always worked so well for draining paper machines. First, they wouldn't vent air fast enough, so that heat-up was slow after the machine had been down. Second, they didn't wear too well.

The Armstrong No. 813D steam trap was designed to answer these objections. That it does has been proved by many mills with individual 813D traps on each dryer.

Large air venting capacity is secured with oversize bucket vents.

Long life with infrequent maintenance has been secured by:

1. An extended inlet tube which admits condensate, steam and air into the trap above the water level in the bucket. This eliminates excessive wear-producing agitation of the mechanism.

2. Chrome steel valve and seat — hardened, ground and lapped — same as used in traps for 900°F., 950 psig. All other working parts 18-8 stainless steel, heavily reinforced for wear.

With this trap you get all the advantages of simplicity, economy, dependability and fast drainage with none of the previous disadvantages. SEND FOR BULLETIN No. 205.

ARMSTRONG MACHINE WORKS
816 Hoffman Street, Three Rivers, Michigan

ARMSTRONG

Moisture Control Systems
Individual Dryer Temperature Controls
Paper Machine Drainage Traps
Inverted Bucket Steam Traps
Steam Humidifiers

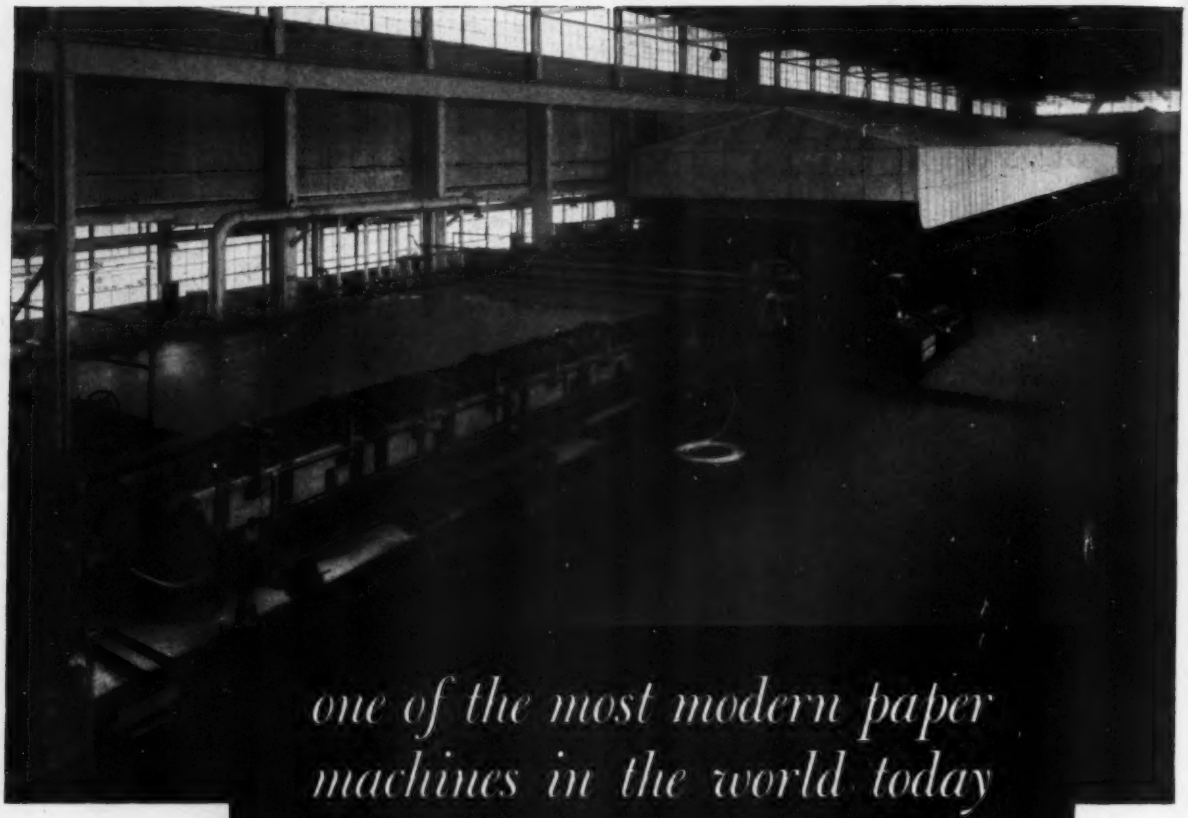
Surface
Density
can be
controlled with

KELSIZE
and
KELGIN

Outstanding advantages obtained are:

Kelsize and Kelgin®...
products of
KELCO
Company

Picture of Gurley Densometer.
Courtesy of W. & L. E. Gurley



one of the most modern paper machines in the world today

We have designed and built what we believe to be one of the most modern paper machines in the world today. As the modern paper machine has grown in width and speed, it has outgrown mechanical controls . . . but we believe hydraulics is an ideal means of control. This Bagley & Sewall machine is the most completely hydraulic-controlled paper machine in the world. Each major operating unit requiring movement—each pressure operation and control is at finger-tip selection at a station point or console . . . providing instantaneous and accurate operation of the entire machine for the utmost control and productivity.

Recently installed at the St. Regis Paper Company, Cantonment, Florida, this machine has a wire width of 228" and was designed for a production of 400 tons per day at a speed of 2200 feet per minute.

designers and builders of paper making machinery since 1853

BAGLEY & SEWALL

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NEW YORK

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Helsingfors, Finland

ELLIOTT CROCKER-WHEELER *Sealedpower* MOTOR

■ Here's a motor that doesn't care how tough the conditions are. Blizzards of dust or grit can't affect it—not only can't get *in*, but can't even stay *on* the outer case. The powerful fan-driven, cowl-directed air blast sweeps it off, and also drives off the heat radiated from the many fins.

Easy to see why this Sealedpower motor has for **eleven years** been the ace-in-the-hole among engineers who are confronted with drive conditions that would defeat ordinary motors.

Thousands now in service, and going strong in oil refineries, lumber mills, chemical and textile plants, outdoor and indoor installations everywhere. 3 to 125 hp. Also as explosion-proof underwriters approved in most ratings. Get the facts. Address Elliott Company, Jeannette, Pa., or your nearest Elliott district office.

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ELLIOTT APPROVED SERVICE SHOPS COVER THE COUNTRY

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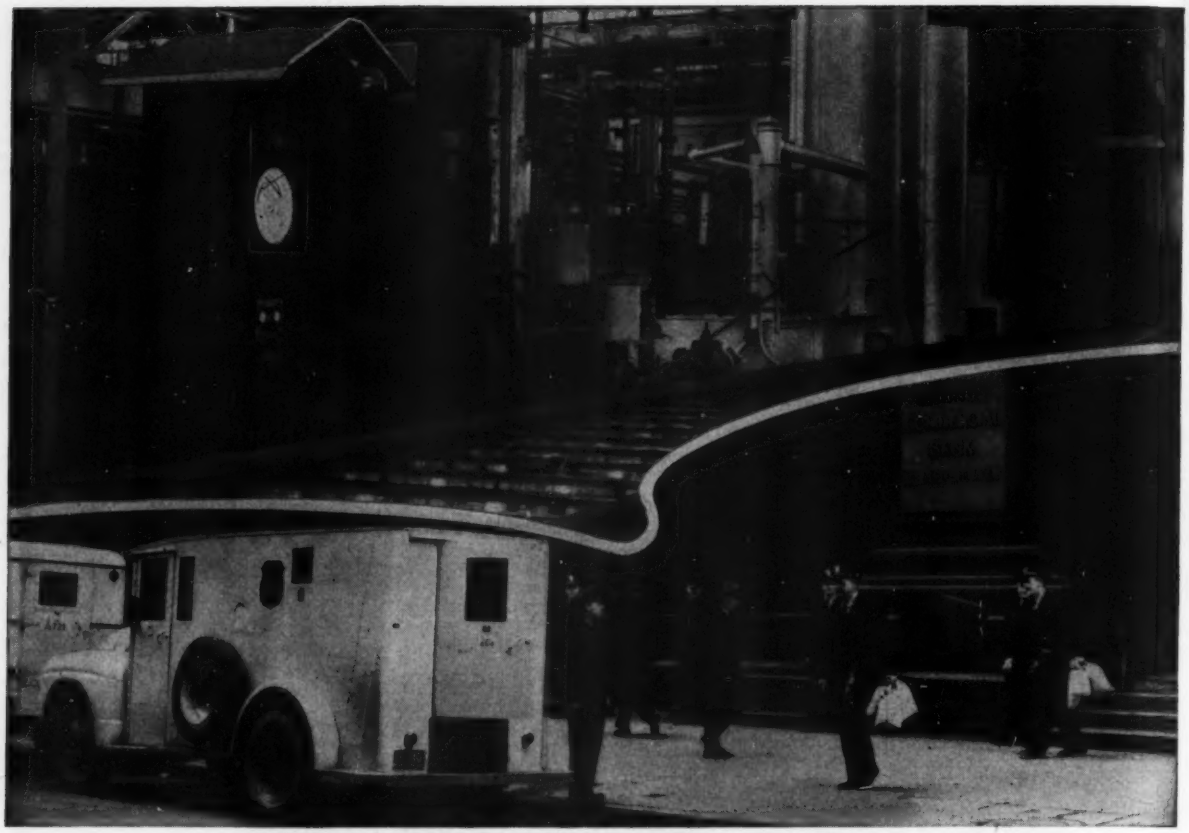


Modern Safeguards—Brink's for Money, Bailey for Process Materials

Are Your Process Materials Guarded As Well?

HERE'S HOW TO PREVENT SPOILAGE AND WASTE . . .

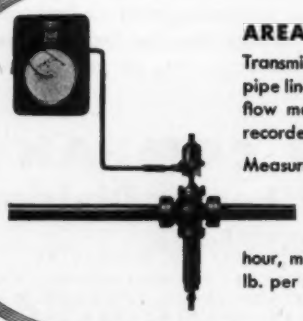
TO avoid waste of valuable process materials and finished products, process rates and conditions must be accurately measured and controlled. That's where Bailey Meters, Analyzers and Controllers can help you to improve the efficiency of your plant.

Take flow for instance. Bailey Meter Company offers a complete line of flow measuring and controlling equipment for applications ranging all the way from high pressure steam to low pressure gas. We measure flow in pipes, open channels, ducts, furnaces, smelters, kilns, ovens, dryers.

When you call Bailey Meter Company, you get the help of years of experience as well as recommendations from a wide selection of measuring and controlling devices.

Your local Bailey Engineer is as near as your telephone. He has the experience and the equipment necessary to set up an effective guard for your process materials.

P-26



AREA TYPE FLOW METER

Transmitter goes into 1, 2 or 4 inch pipe line like a valve and transmits flow measurements electrically to recorder in remote location.

Measures oil and other clear liquids under static pressures up to 600 psi. Minimum range 0 to 1200 lb. per hour, maximum range 0 to 9600 lb. per hour.

BAILEY METER COMPANY

1058 IVANHOE ROAD
CLEVELAND 10, OHIO

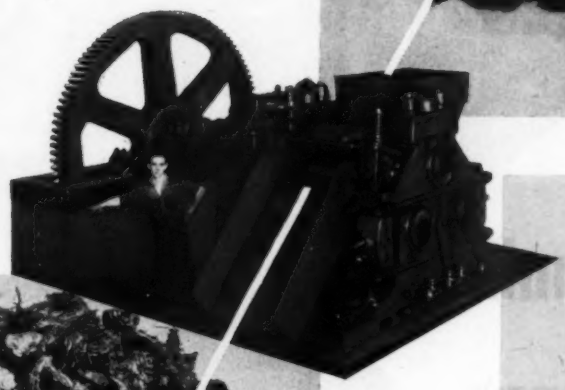
Process Controls

TEMPERATURE · FLOW
PRESSURE · LEVEL
GAS ANALYSIS · RATIO

Once through the FULTON ROLL PRESS made the difference in these knots!

69.6% MOISTURE (Before)

Unretouched photo of soggy mass of knots soaked in black liquors, just as they came from the digester. Note how cooking failed to reduce knots.



44.9% MOISTURE (After)

Unretouched photo of same knots after a few moments in the FULTON Roll Press. Note how thoroughly black liquors have been expressed and fibers broken up.

Independent Testing Laboratory Report Confirms Results of Test Run on Knots for Large Southern Kraft Mill

The pictures tell the story. Here is the answer to one of your knottiest mill problems! The FULTON Roll Press does an equally impressive job on bark, tailings and similar mill waste — permitting redigestion, refining or profitable utilization as fuel.

all in ONE LOW-COST, CONTINUOUS operation

The FULTON Roll Press makes costly "batch" methods obsolete—saves so much *labor, power, handling equipment, time* and *money* that it soon pays for itself.

May we Prove It by processing a sample of your material without obligation?

FULTON

FULTON IRON WORKS COMPANY

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for full details and FREE TEST RUN OF MATERIALS YOU WANT TO PROCESS

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Please send full details of FULTON ROLL PRESS
☐ We are interested in FREE test run of.....
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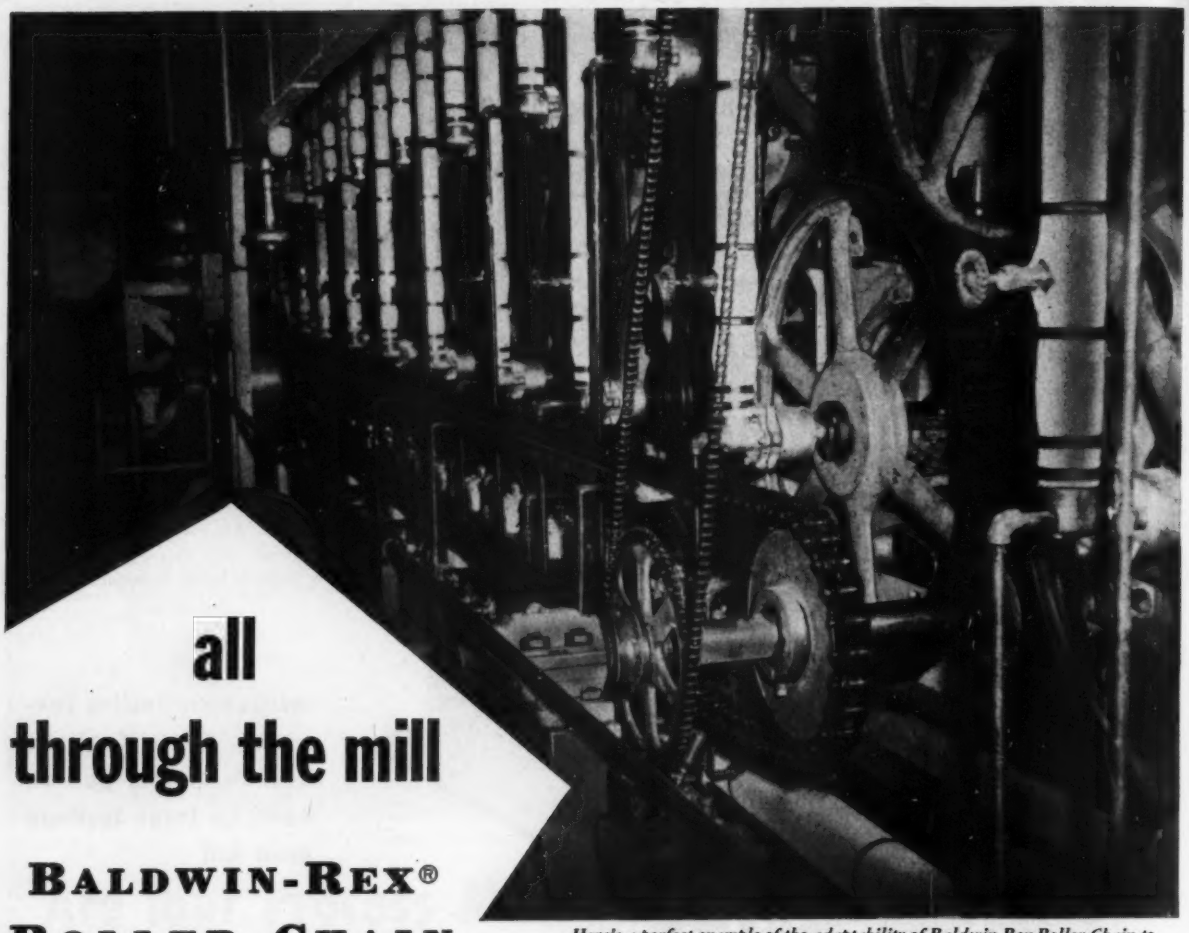
ADDRESS.....
CITY.....ZONE.....STATE.....



all through the mill

BALDWIN-REX® ROLLER CHAIN

Here's a perfect example of the adaptability of Baldwin-Rex Roller Chain to long center drives. This one is on a calendering machine in a large paper mill.

transmits power for you . . . economically

For efficient, high speed drives and power takeoffs you can't beat Baldwin-Rex Roller Chain. Mill after mill has standardized on Baldwin-Rex because this chain has proved itself over the years as the dependable, lowest cost power transmission medium.

Precision built of the finest finished steel, Baldwin-Rex Roller Chain has plenty of stamina to stand up under the toughest kind of service. It is available in a complete line from ¼" to 2½" pitch in single, double, triple and quadruple strand.

Your Rex Field Sales Engineer can help you select the exact size of Baldwin-Rex Roller Chain which will give most years of service at lowest overall cost. Or, if roller chain is not the best answer for your particular application, he'll show how you can get the best service at lowest overall cost from some other chain such as Rex® Chabelco®. Here, again, the value of a complete line from which to choose is readily apparent.

And, don't forget, when it comes to conveyor chains for every application, the Chain Belt line is second to none. In short, you can fill all your power transmission and conveying needs with confidence from the complete Rex and Baldwin-Rex line of chains, sprockets, idlers and bucket elevators.

• • •

For all the facts, *call your nearest Chain Belt Field Sales Engineer or write for Bulletin 51-53 which contains complete details and specifications on all Rex and Baldwin-Rex pulp and paper mill chains and sprockets. Chain Belt Company, 4714 West Greenfield Ave., Milwaukee 1, Wis.*

BALDWIN-REX • ROLLER CHAINS

A PRODUCT OF

Chain Belt COMPANY

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Atlanta • Birmingham • Boston • Buffalo • Chicago • Cincinnati • Cleveland
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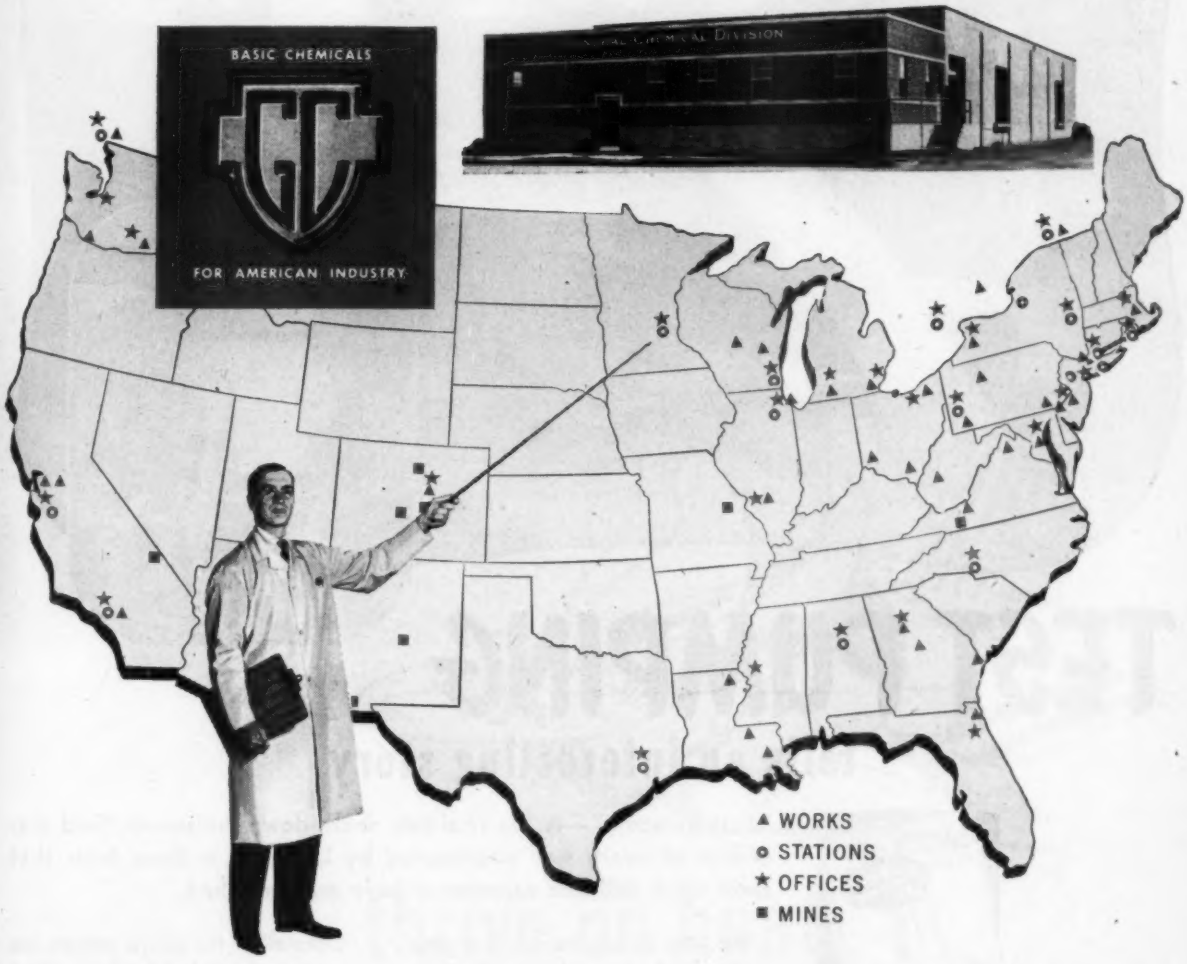
GEARED TO MEET TODAY'S NEEDS

General Chemical's Distributing Station Now—Finer Than Ever!



TO HELP SUPPLY Industry's chemical requirements swiftly and smoothly, General Chemical has created *almost 100 service and supply points across the country.* Among these is General's extensive chain of Distributing Stations now equipped to provide finer services than ever in major centers of commerce.

MANY HAVE BEEN greatly expanded over the past year. Some have been relocated in large new quarters designed especially for storing and shipping heavy, fine and laboratory chemicals.

THIS MONTH, General is moving its Minneapolis Station into the large new office and warehouse pictured here. Recently, it opened similar quarters for its Stations in Albany and Syracuse, N. Y., Birmingham, Ala., Houston, Texas, and Montreal, Quebec.*

EACH EXPANSION, each new station, has been created for a single purpose—to mesh with General Chemical's Producing Works in providing the best possible service to chemical consumers from coast to coast.

THESE MODERN integrated distribution facilities can mean much in handling your chemical purchasing problems wherever your operations may be located. You will find them particularly advantageous if you have many plants being served by a central purchasing department.

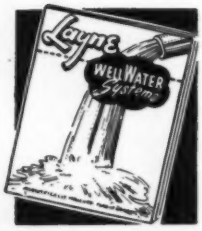
Let us put these facilities to work for you—soon!

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
Offices in Principal Cities from Coast to Coast
*In Canada: The Nichols Chemical Company Limited

ACIDS • ALUMS • SODIUM COMPOUNDS • PHOSPHATES • FLUORINE DERIVATIVES • REAGENTS & FINE CHEMICALS

TEST PUMPING

tells an interesting story



The outstanding features of Layne constructed wells and pumps are pictured and described in a catalog entitled "Layne Well Water Systems." A copy will be sent on request.

"Test Pumping"—is the trial run, shake-down cruise—or field maneuver of every well constructed by Layne. It is these tests that show what skill and experience have accomplished.

But long before the test pumping can be made, Layne has had to do a lot of planning, plotting and figuring out of such things as; kind of sand screen, size of drive shaft, type of bearings, number of pump stages and how much horsepower the motors should have to produce a promised amount of water against a certain pressure.

Once all of the above answers are on paper, they must be transmitted into an underground construction project—a task that requires more than ordinary skill and ability.

But wherever water is needed in quantity and at low cost, you may be sure that units installed by Layne will have unmatched efficiency, operate with utmost smoothness, be ever dependable and capable of lasting many, many years.

For further information on any phase of water development, address

LAYNE & BOWLER, INC.
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WATER WELLS
VERTICAL TURBINE PUMPS
WATER TREATMENT

ASTEN

dryer felts

thrive on heat

Because they have all asbestos yarn in both directions on the sheet side, ASTENS feel right at home where the dryers are hottest. That's why they last longer and cut tonnage costs.

Economy in the long run

ASTEN-HILL MFG. CO.
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ASTEN-HILL LIMITED
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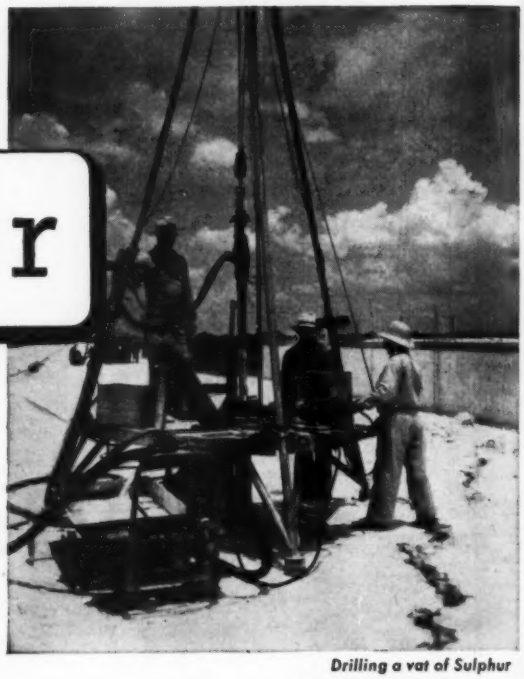
Sulphur



Drilling a vat of Sulphur preparatory to blasting down

Thousands of tons mined daily, but where does it all go?

All through the open seasons—spring, summer and fall—homes everywhere are being painted, old houses as well as new getting much needed protection from the elements. It's an activity seen by millions but few realize how important Sulphur is to this phase of our domestic economy. Actually, it's an essential commodity.

That's right. Paint pigments constitute one of the largest individual consumers of Sulphur . . . in the form of sulphuric acid. Government statistics show that for the year 1950 some 1,260,000 tons of 100% H_2SO_4 were consumed by producers of lead, zinc and titanium pigments. Translated into Sulphur, this means around 400,000 long tons which is a lot of Sulphur! In fact, the pigment industry stands 5th on the list of the many industries that consume Sulphur in one form or another during their manufacturing processes.

The Sulphur Industry indeed has many mouths to feed, all important to our economy and standard of living.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

POWELL gives you flow control at its best!

Advanced engineering, laboratory control of all materials, expert workmanship and over a century of manufacturing experience make Powell Valves what they are today — flow control equipment at its best.

And because they are made to suit the service, there are more kinds of Powell Valves in use today than of any other individual make.

The Wm. Powell Company
Cincinnati 22, Ohio

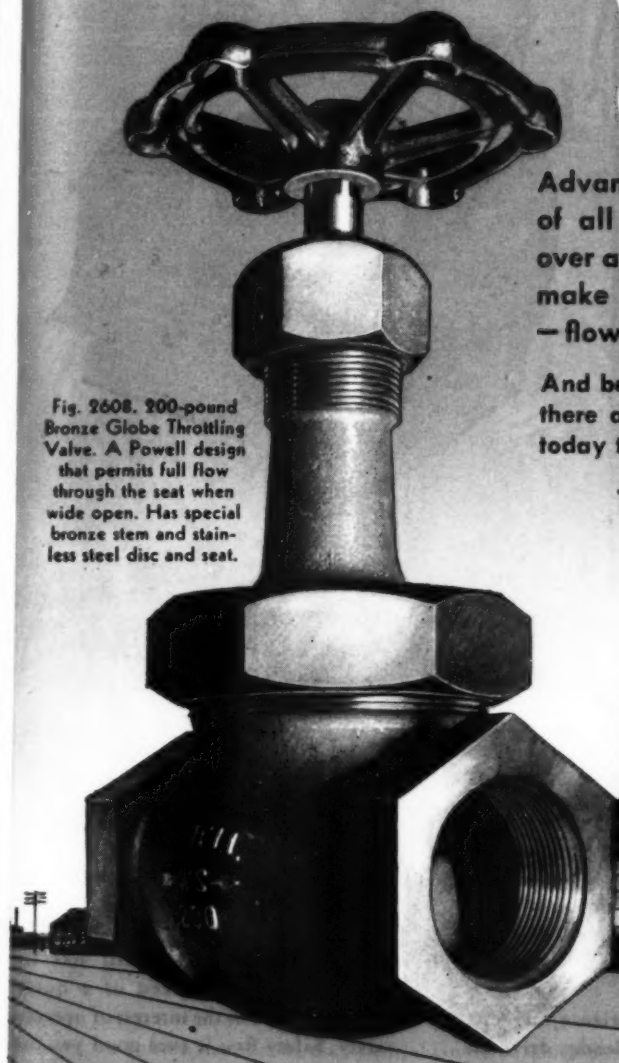
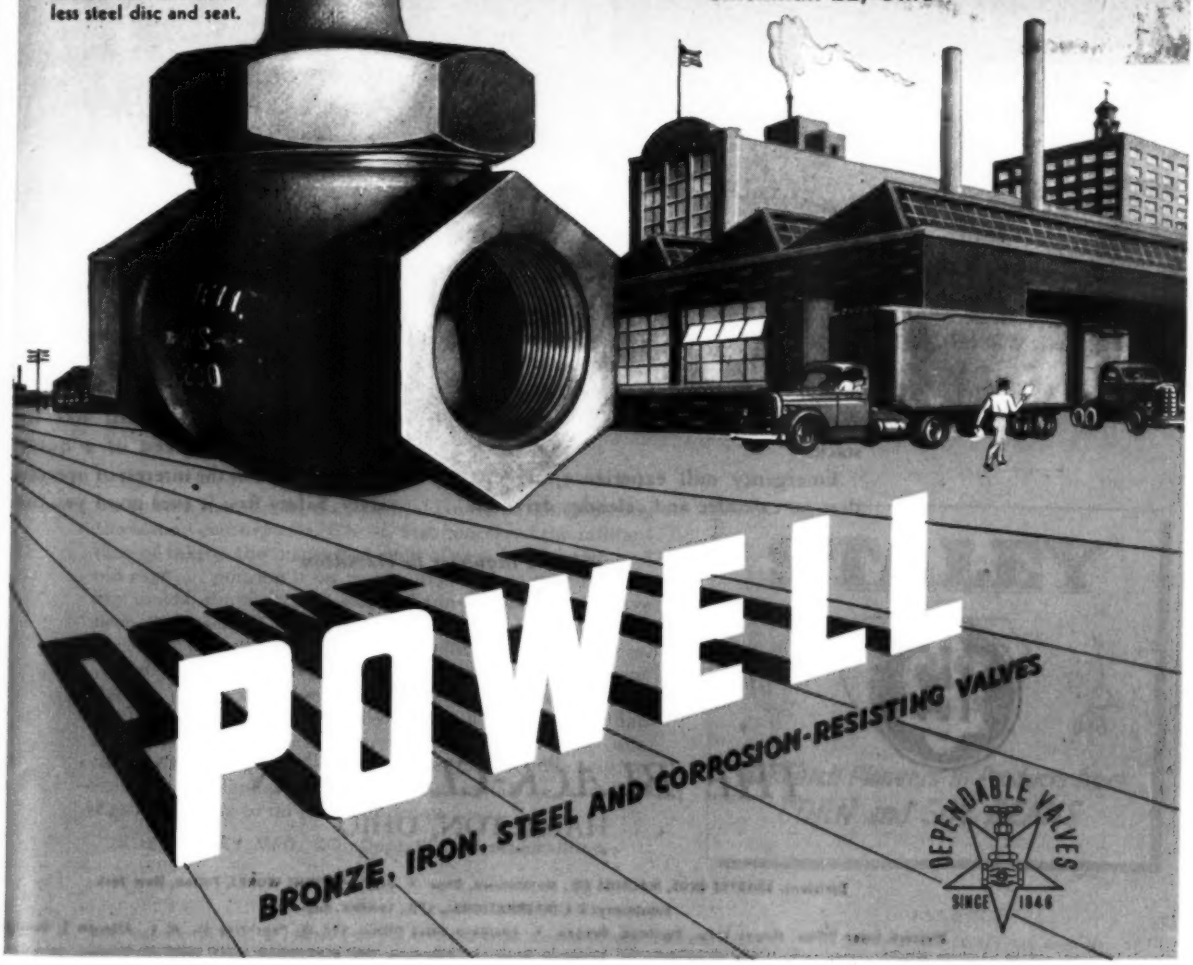


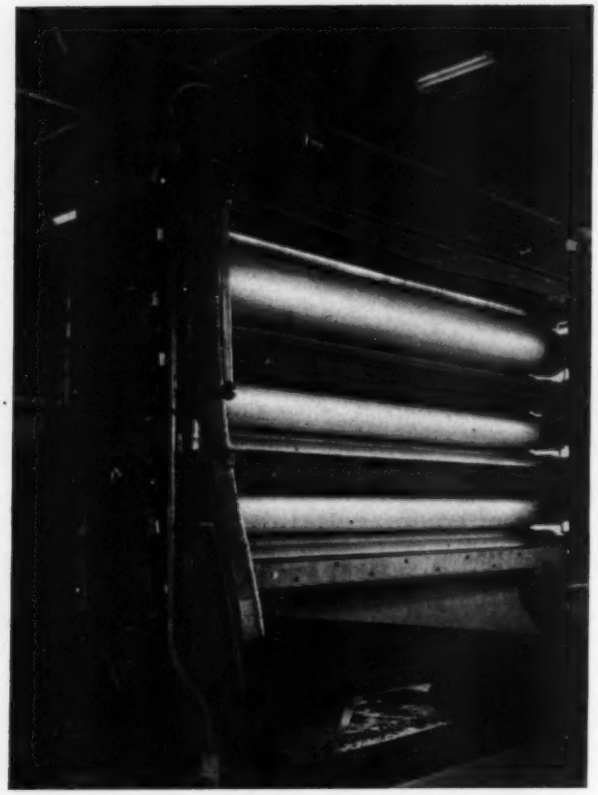
Fig. 2608. 200-pound Bronze Globe Throttling Valve. A Powell design that permits full flow through the seat when wide open. Has special bronze stem and stainless steel disc and seat.

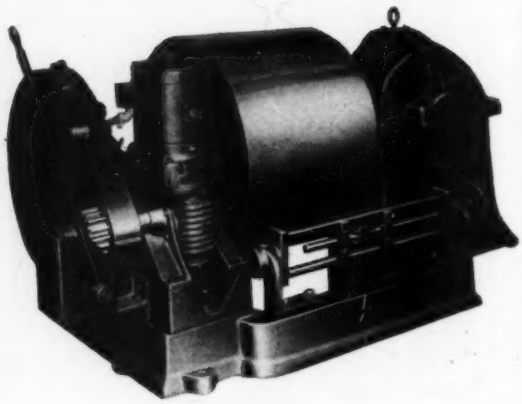


POWELL

BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES

DEPENDABLE VALVES SINCE 1846





Black-Clawson Calender and Calender Drive Assembly

Massive box-type frames, bearings and rolls removable endwise through the frames, doctors mounted from bearing housings, and many other dependable features too numerous to mention characterize the Black-Clawson calender stack.

Emergency mill experience suggests that no calender and calender drive assembly is adequate unless the direction of the drive can be reversed almost instantly when plug occurs. Black-Clawson calender reversing drives meet that requirement.

Bitter mill experience all too frequently shows the need of a quick-reversing drive in the interest of operator safety. Safety first is ever good practice.

Address inquiries to Hamilton

THE BLACK-CLAWSON CO.

HAMILTON, OHIO

Divisions: SHARTLE BROS. MACHINE CO., Middletown, Ohio • DILTS MACHINE WORKS, Fulton, New York
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The World's First Papermaker in Action

Ts'ai Lun, member of the Imperial Guard of China during the second century after Christ, first conceived the brilliant idea of taking the macerated pulp of tree bark, hemp and old rags . . . pouring it on molds, drying it to make paper. His molds, simply coarse cloth within a wood frame, have been the essential tool in making paper by hand for centuries, as well as the basis for all modern paper machines.

Today, paper making is far more complex and efficient than in Ts'ai Lun's time, and Staley is proud to be a part of this vital industry. Staley makes a full line of high grade starches and dextrin products that mean more efficient mill operation. More and more paper mills rely on Staley for dependable quality raw materials . . . and find it *good business* to do so. Write *today*.

A. E. STALEY MFG. CO., Dept. PI-7, Decatur, Illinois

STALEY

Staley PRODUCTS

Research Pioneers in Products from CORN and SOY BEANS

SIZING STARCHES

Staley makes a full range of starches and dextrins for beater, surface or calender sizing.

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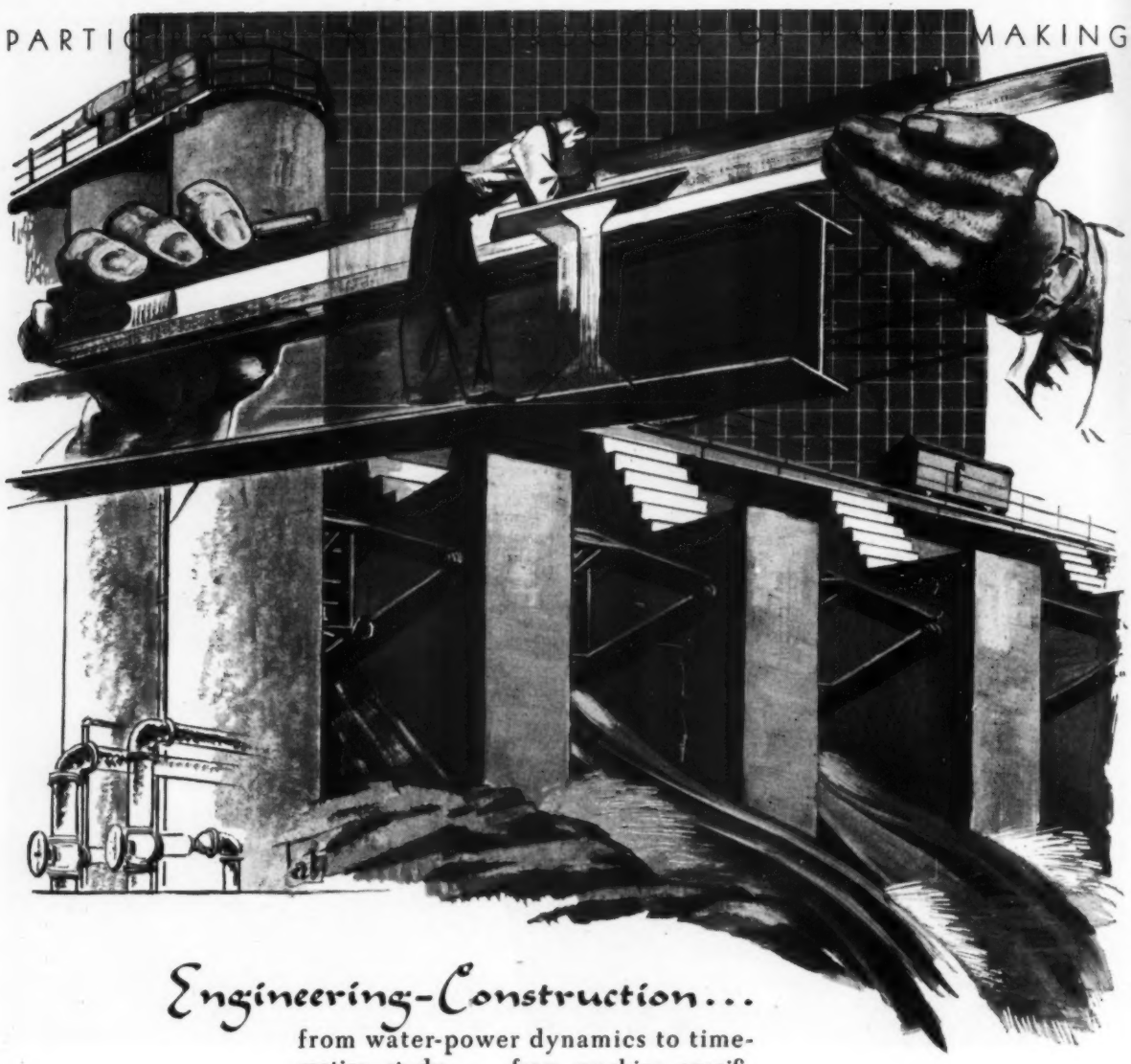
PLASTICIZERS

"Sweetose" and Staley's corn syrup are

PARTI MAKING



Engineering-Construction...

from water-power dynamics to time-motion study . . . from machine specification to complete structural design . . . engineering-construction helps keep the paper industry *ahead* of mere modernity!

Fourdrinier Wires...

as fabricated for 56 years by Appleton Wire Works, Inc., integrate priceless experience with tireless research . . . resulting in the *earned* reputation that *"Appleton Wires are Good Wires!"*

APPLETON WIRE WORKS, INCORPORATED • APPLETON, WISCONSIN

better heat economy

patent pending

One of the most striking advantages of Pressure Washing is the way it reduces evaporating costs. By substituting pressure for vacuum, the System can operate successfully at temperatures around 210°F., using wash water at temperatures of 200—205°F. Thus hotter black liquor is sent to the evaporators, and heat recovery is greatly improved.

Get the facts on Pressure Washing. Write for complete data today.

Systems can be furnished in three, four and five stages to fit individual mill needs.

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Manufactured by

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Designed & Engineered by

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all wrapped up and *Going Places*

Pity the poor product that's packaged in drab paper. It won't go very far in today's highly competitive markets. That's why America's smartest merchandisers want paper that provides standout package-appeal. Titanox pigments will add sales impact to just about any kind of paper. Colors are brightened, printing legibility is boosted, yellowing is checked, show-through is minimized. Our Technical Service Department will be glad to show you how easily Titanox pigments can be added at a convenient stage of your paper processing.

Titanium Pigment Corporation, 111 Broadway, New York 6, N.Y.; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7.

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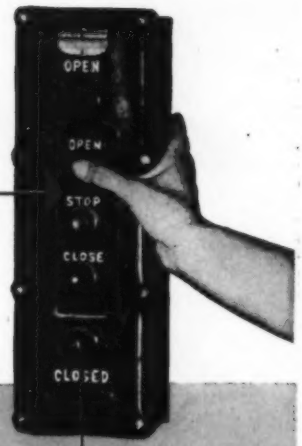
®TITANOX

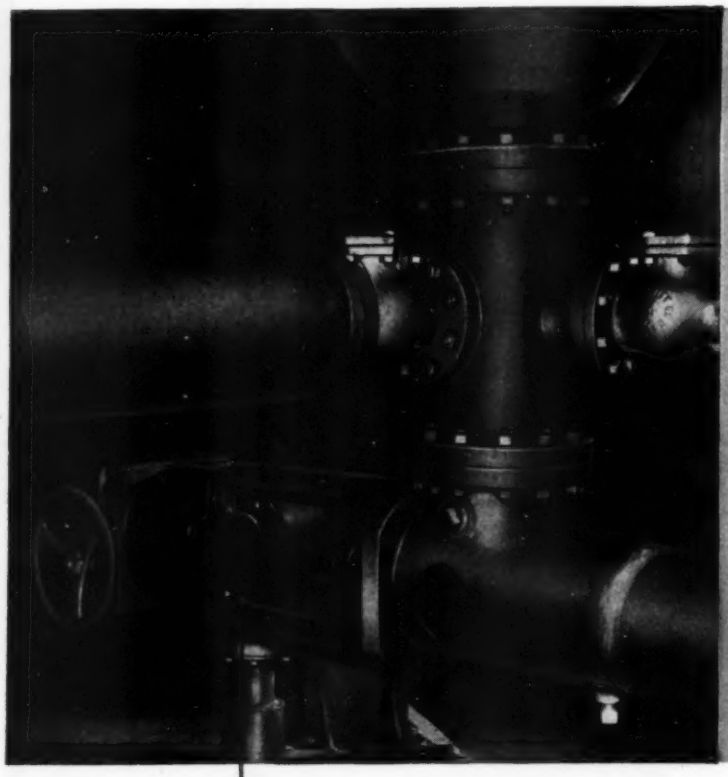
the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

easy way to blow down pulp digesters





Press a button. *That's all there is to it.*

You don't even have to go down to the discharge floor; the button can be conveniently located right on the operating level.

That's one of several reasons why Yarway Remote-Controlled, Motor-Operated, Digester Blow Valves have become standard equipment on pulp digesters in many leading plants—*names on request.*

One of eight Yarway Digester Blow Valves installed at a Canadian paper mill.

OTHER REASONS:

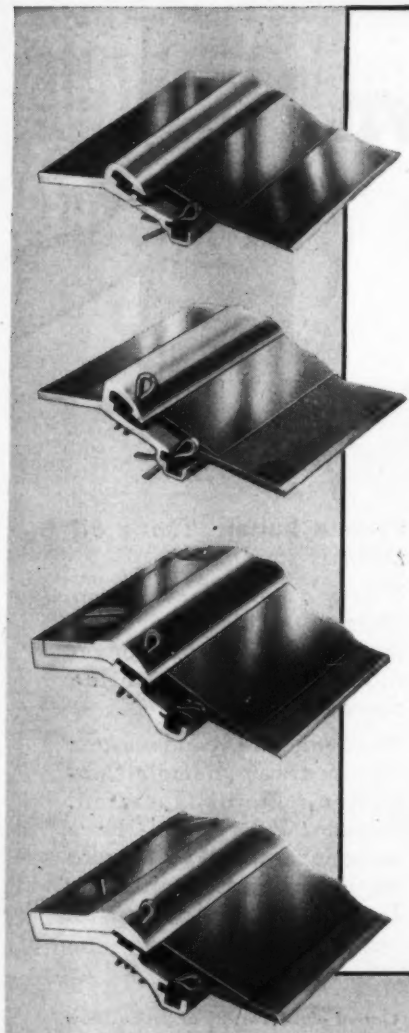
1. The famous Yarway non-clog *seatless* operating principle that assures tightness and effectively seals off the digester, preventing loss of black liquor and increasing the number of cooks per day.
2. Yarway's rugged construction withstands severe shock.
3. Yarway's modern metallurgy withstands severe chemical action.
4. Fast operation results from motor control and self-cleaning free discharge.

If you are interested in increased production, low maintenance, savings in labor—then you're interested in Yarway Digester Blow Valves. Write for full description and specifications in Yarway Bulletin B-440.

YARNALL-WARING COMPANY

149 Mermaid Ave., Phila. 18, Pa. • Branch offices in Principal Cities

YARWAY



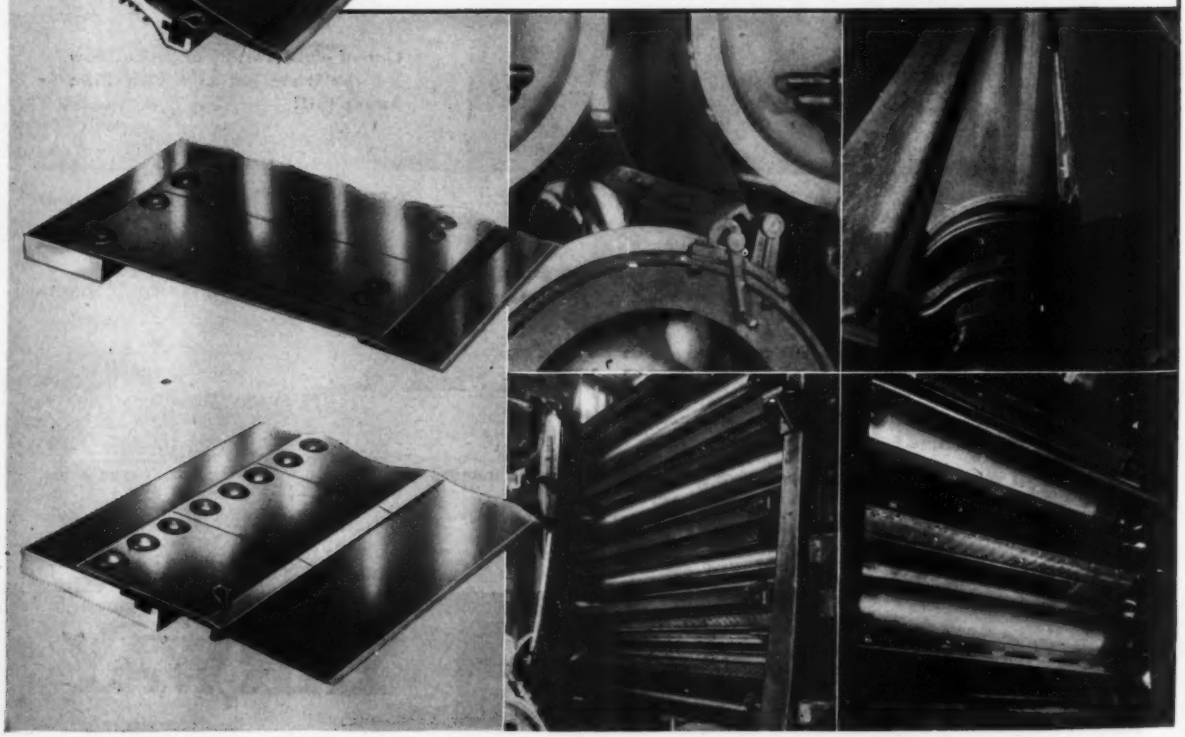
NOTICE TO PAPERMAKERS

Every papermaking roll should be equipped with a

VICKERY DOCTOR

carefully engineered to fit each individual roll and service requirement — and calculated to assure continuously efficient roll performance at lowest cost for operation and maintenance.

BIRD MACHINE COMPANY
South Walpole, Massachusetts



The Paper Industry

July 1952

Democracy at Chicago

Every four years this country experiences a peculiar demonstration of democracy at work. To peoples over all the world it is at the same time comic and provocatively serious. The foreign press is inclined to satire the falderal; and yet citizens of all nations look upon that "falderal" with the deeply emotional prayer that someday they too might participate in such a valuable heritage.

For when the two great political parties of the United States stage their respective conventions the immediate impression is a bit ridiculous: the bands, the parades, the oratory, the wrangles—the "hot-time-in-the-old-town-tonight" atmosphere. Behind that picture is a priceless privilege.

It is a privilege simply because it is a representation of freedom. It is where men of every race, color, and creed come together to voice their preference for a leader who will unite the nation. To be sure, the Republicans and the Democrats do not see eye-to-eye on major issues. If they did, the entire idea and ideal of democracy would be superfluous. But on American issues the gatherings are so similar as to be almost indistinguishable.

This month in Chicago there will be bitter words. There will be sharply defined lines of difference. On foreign policy, as on domestic issues, the Republicans and the Democrats will appear to the rest of the world as irreconcilable enemies. That gives to the foreign press the opportunity for satire.

But much deeper than the surface issues are the basic and heartfelt plea which both parties pose to the American people: peace, prosperity, and increasingly deserved freedoms. For above the partisanship is the overriding will to preserve the nation as the world's symbol of hope after pathos.

Continued prosperity

Business and industry has been inclined to proceed with caution in the years since the close of World War II. Expansion certainly has been tremendous—almost unbelievable. But that expansion has come about only after careful consideration. As demonstrated through the years, a post-war period treads on thin ice. A nation, no matter how strong and prosperous when peace comes, can well be thrown to oblivion by undue haste at this difficult crossroads. And when a prediction of "continued prosperity" is made by competent economists it must be made with a word of warning.

Currently, business experts foresee a smooth highway ahead. They also see possible detours where the traveler must pause for thought. Such detours may come where least expected—hence more dangerous. An example: total inventories in the hands of American business are estimated at more than $70,000,000,000—probably an all-time high; retail inventories, however, have turned downward; the picture is complicated and mixed.

A good omen already obvious in the United States, an omen worthy of pride for its financial soundness, concerns the increase in income. For with that increase has not come a corresponding increase in consumption, which could well be expected. On the contrary, personal consumption has not grown so rapidly, indicating both a reluctance to buy and a high rate of personal savings. With such caution comes a realization that the American people think twice before putting their money "on a sure thing."

And so on. In the immediate future there will be many opportunities to choose wisely at the crossroads. There will be temptations. However, if the business economy continues to operate in a manner similar to its performance during the post-war years, there is no reason to believe that the fork in the road will hold a pitfall. For, although caution has been the watchword, there has been no inclination to delay progress. On the contrary, this nation in a few short years has demonstrated a basic will to improve its place in economic affairs. In no other period in our history has there been such expansion in the areas of business and industry that in themselves promise continued success in operations—expansion in plant facilities, in industrial research, in new product development, and in product adaption to mass markets.

Piling Up the Pulp

LOADS LOGS LIKE MATCHES. This International TD-14A takes time off from building roads to load a truck with a special arch boom loader designed by International Paper's General Superintendent, T. N. Busch.

International power speeds up work for International Paper

Down on their 300,000 acre stretch of Louisiana timberland, the Southern Kraft Division of International Paper Company uses crawlers to get out their pulpwood.

For example, in the "Olla Block" district, Superintendent M. R. Smith has two TD-14As, and a TD-9 building roads, skidding logs, and even loading pulpwood on trucks.

He finds these rugged, reliable IH crawlers are really right for work in the woods.

Ask your International Industrial Distributor for details on the complete International line. Whether your woods show is large or small, see how International "Power that Pays" can pay off for you!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

POWER THAT PAYS — **INTERNATIONAL**

The Paper Industry Current Comment

Bagasse in the news

Bagasse and newsprint, separately and in combination, featured the developments of the month in the paper industry. The use of bagasse as a raw material for newsprint, its use for other grades, and the complications resulting from the Canadian increase in the price of newsprint make up the high points of the month.

Actual imports of bagasse boards and papers from South America and moves to carry on intensive experiments for the domestic production of papers from this raw material were both in the public eye.

Principal publicity was given to a showing of bagasse papers from Peru at a press conference staged by W. R. Grace Co., a shipping firm which has expanded its maritime operations for the development of industry in the regions where its ships operate. One feature of the Grace showing was to secure publicity for the sale of royalty rights for the use of the processes developed in Peru by cooperation between the Grace interests and Sandy Hill Iron & Brass Works, which has supplied the equipment to the Peruvian mill. The bagasse exhibit included newsprint paper, wrapping, book and printing papers, as well as shipping sacks and coarser products, such as corrugated containers with a bagasse base.

A Lima newspaper has used bagasse newsprint in its regular editions, but the cost runs from $90 to $100 per ton, a figure which does not mean present competition in the American market. However, a higher grade printing paper has been shipped to this country for experimental uses, and newspaper reports are that it has been used experimentally by the *New York Times* and the *Journal of Commerce of New York*, though not in quantity production. According to Grace, newsprint production from bagasse is not practical at present. However, the *Savannah Morning News* has made a press run on 1,000 copies from bagasse newsprint produced by the Herty Foundation laboratories. While press runs have been made experimentally, the quality comparison with wood pulp newsprint is something else again.

Meanwhile a ton of Louisiana bagasse is to be used by government experimenters, who will test its paper-making qualities. There is no question that paper of a sort can be made from any vegetable fibre, but what can be done in the laboratory is not always commercially practicable. It is with a view to developing practical means of using bagasse that research work is being intensified.

Much will be heard in the months to come of bagasse, and it can be expected that there will be loud claims of successful production, as well as equally loud skepticism from those wedded to the use of wood pulps.

Canadian newsprint boost

With all the furor over the new Canadian price for newsprint, it is apparent that the plaints of newspaper publishers and the protests of members of Congress will get nowhere in securing any remedial action. The newspaper publishers say some papers will be starved out of existence, and that the industry is approaching the point of diminishing returns in both the circulation and advertising fields. One thing is certain, the Canadian government will not, despite all pressure from this side of the border, reconsider its authorization to the Canadian mills for the recent $10 per ton increase.

Labor threat

A tightening situation in the labor field does not bode well for many industries dependent on iron for their converting operations. Promises of the union to allow production of steel for needed defense operations is not so easy to put into effect as it was to promise.

The issue of the union shop, which despite union claims to the contrary is the principal stumbling block in the pending and all but abandoned negotiations, is likely to have wide repercussions. There is a significant trend in industry on the part of the employed workers to shy away from setting up new unions. In Cleveland, in nearly 40 elections to determine whether the workers wanted to be unionized or not, over three quarters of the shops voted against unionization. The employes, apparently, felt that enlightened management was giving them adequate wage adjustments, and hesitated to risk unemployment over a long period by seeking questionable fringe benefits. It is because of this trend away from the big unions that the steel union is endeavoring to tie up the entire steel industry with a blanket union shop agreement, rather than risk defeat in a series of individual mill elections.

New York tax beaten

The fear that New York City would impose a sales tax and use tax on containers, wrapping and packaging materials has been dissipated by the city council finance committee's disapproval of the bill to impose such a tax. It was felt that such a tax would be so difficult to enforce that the expense of collection would be greater than the potential revenue.

Despite the softening of the market for European pulp, and some domestic paper price adjustments, there is a general attitude of optimism for the second quarter of the year. There is definitely a stronger sentiment among buyers, especially as the slack production months just past have resulted in a material reduction of inventories in the hands of merchants and consumers.

Waste paper

The waste paper market is a problem child. While the mills using waste papers want to keep the channels of supply open for the time when the demand is greater, the market is so weak that in many of the lower grades of waste paper collectors find it cheaper to burn the waste than to finance warehouse space. The waste paper market is always one in which there is a feast or a famine, and paper board markets have been so weak that the usage of waste paper fell off to a startlingly low figure. With the board demand again moving upward, the condition may not long be at as low a state as at this writing.

Financial reports

A high average for more than twenty years in the New York stock market was based principally on strength in rails and oils. Industrials did not come up to the average of the other groups, though they

were well up from the earlier months of the year. Paper mill securities generally were in line with other industrials, prices being less attractive in view of the lower net profits experienced as a result of the high taxes.

Net incomes

Albermarle Paper Mfg. Co. (including Halifax Paper Co., Inc.)—Net income for the year ended March 30 was $1,094,368, compared wtih $1,043,096 in the previous fiscal year.

A. P. W. Products Co.—Net income for the March quarter was $14,718, as compared with $76,902 for the same quarter in 1951.

Bathurst Power & Paper Co., Ltd.—Net profit for the March quarter was $635,460, compared with $728,114 last year.

Bowater's Newfoundland Pulp & Paper Mills Ltd.—Consolidated net profit for the year ended September 30 was $4,069,829, compared with $2,977,710 for the previous year.

Celotex Corp.—A ten week strike by employees at the company's main plant reduced net income for six months ending April 30 to $119,766, as compared with $1,594,276 for the comparable period a year ago. The strike ended with union acceptance of substantially the terms offered by the company prior to the strike.

Coosa River Newsprint Co.—Net profit for 1951 was $2,113,690, compared with $857,022 in 1950.

Dryden Paper Co., Ltd.—Net profit for six months ended March 31 was $689,616, compared with $424,558 for the same period in 1951.

Marathon Corp.—Net income for six months ended April 30 was $3,511,122, as against $3,800,957 for the comparable period a year ago.

Mersey Paper Co.—Net income for 1951 was $2,723,325, compared with $3,192,709 in 1950.

Port Huron Sulphite & Paper Co.—Net income for the year to February 2 was $236,122, compared with $383,750 in the previous fiscal year.

Sutherland Paper Co.—Net income for three months ended March 31 was $569,439, as compared with $814,128 a year ago.

Union Bag & Paper Corp.—Net income for the first quarter was $2,642,392, as against $3,152,693 a year ago.

United Wallpaper, Inc.—A deficit of $458,140 was reported for the March quarter, as against a net income of $709,535 for the same quarter a year ago.

Westminster Paper Co., Ltd.—Net income for the year ended January 31 was $626,741, compared with $421,255 in the previous fiscal year.

West Virginia Pulp & Paper Co.—Net income for six months ended April 30 was $5,535,000, as compared with $5,596,000 for the comparable period a year ago.

Weyerhaeuser Timber Co.—Net profit for the quarter ended March 31 was $8,900,264, compared with $9,997,073 for the same period a year ago.

Dividend declarations

Celanese Corp. of America has declared a dividend of 50 cents a share on the common, payable June 24 to stockholders of record June 6.

Consolidated Paper Co. has declared a dividend of 50 cents a common share, payable September 2 to record of August 20.

Fort Wayne Corrugated Paper Co. has ordered a dividend of 25 cents on the common, payable June 16 to stock of record June 2.

Fox Paper Co. has declared a quarterly dividend of 50 cents a share on common stock for payment June 14 to holders of record June 7.

Hinde & Dauche Paper Co. increased its quarterly dividend on common to 35 from 30 cents a share with a declaration payable June 30.

(*Continued on page* 446)

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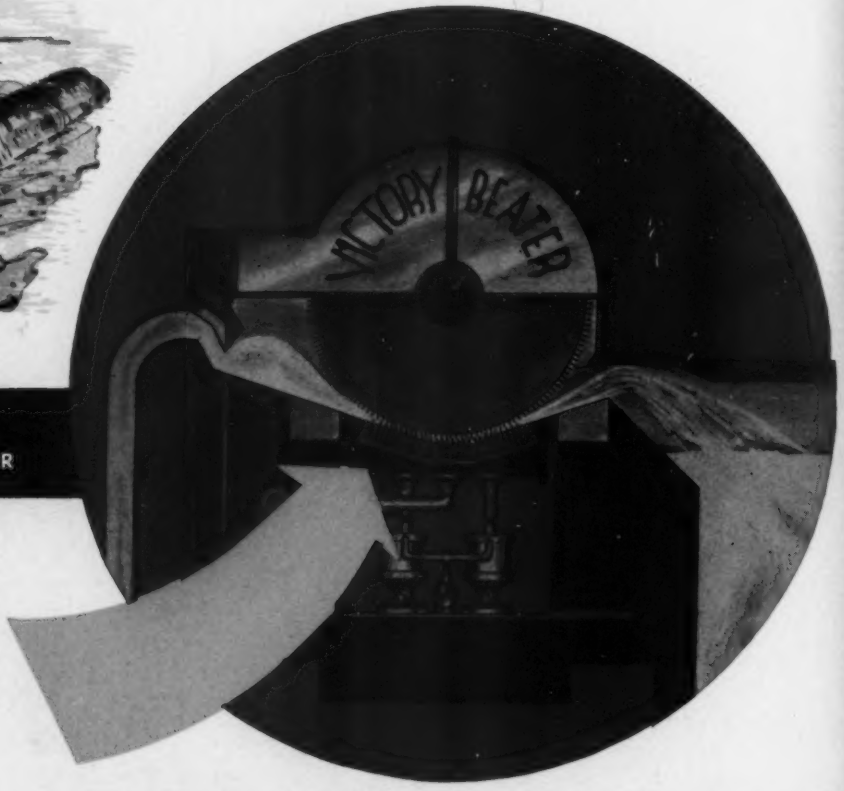

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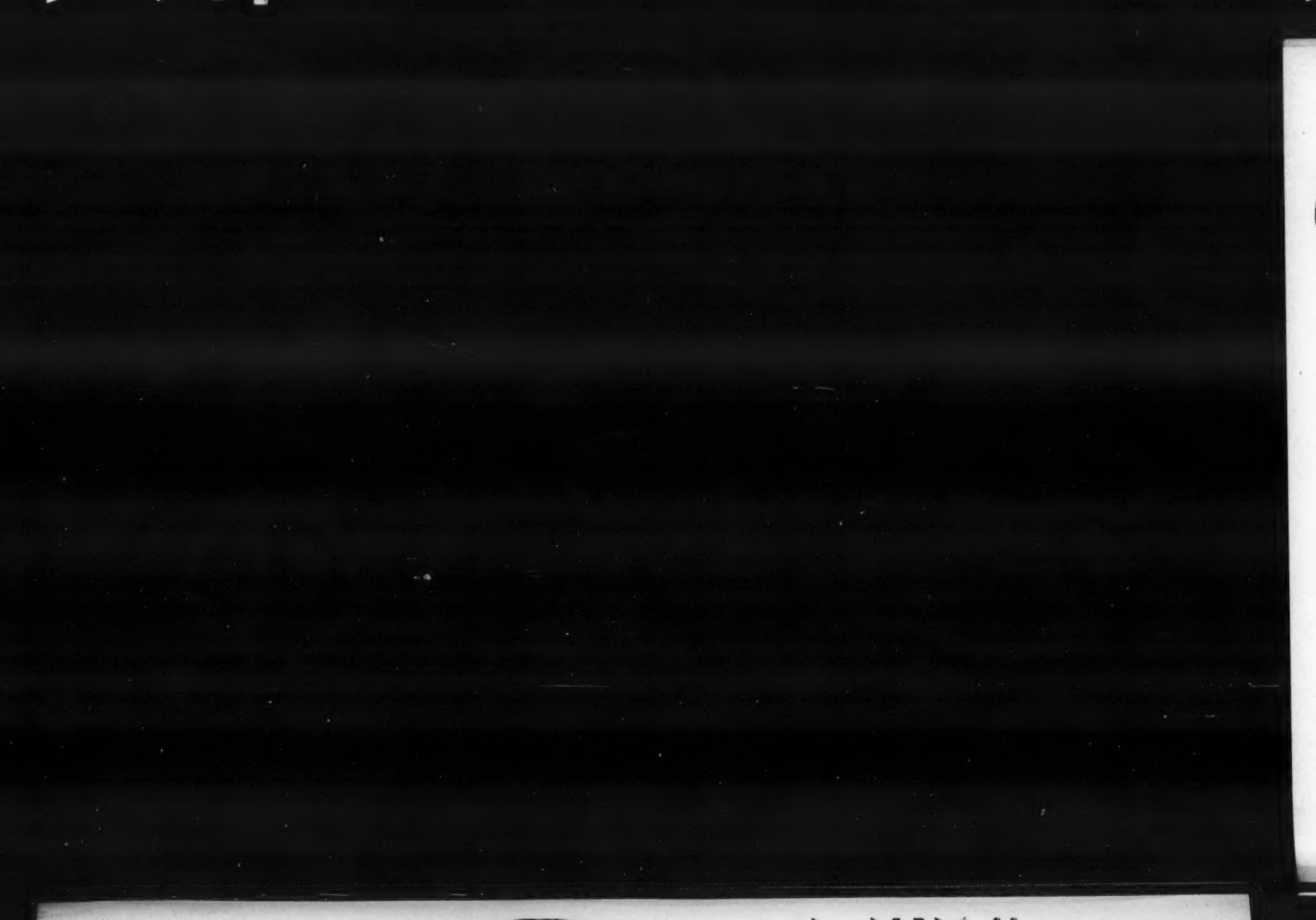

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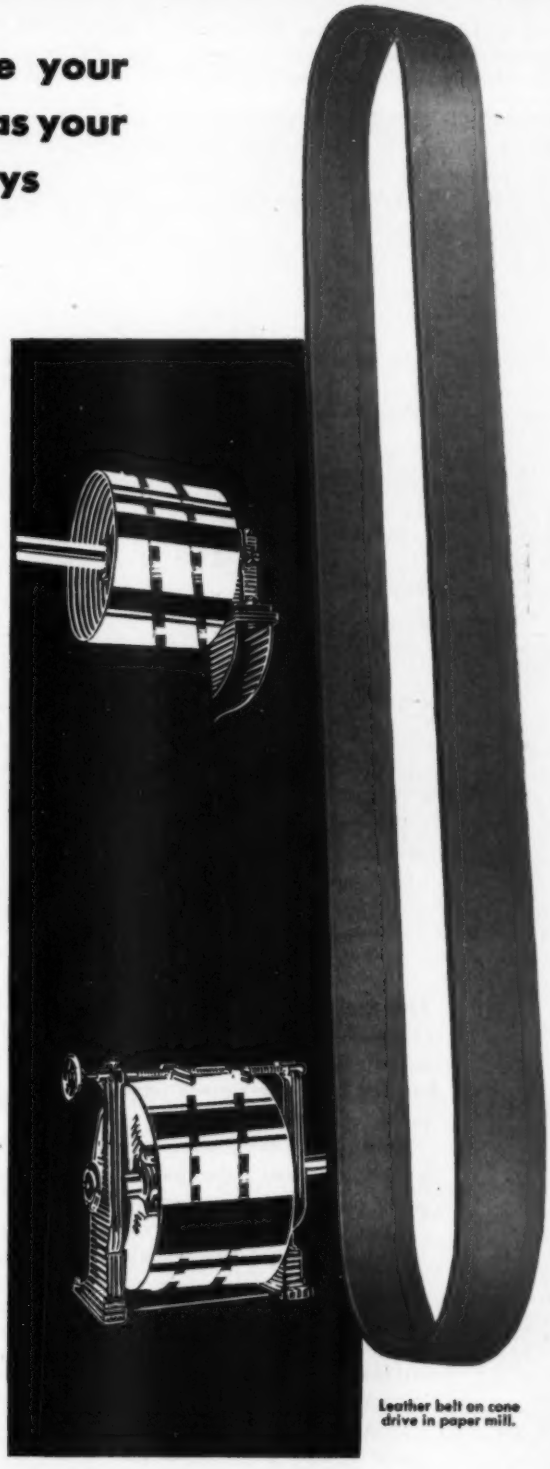

Leather belt on cone drive in paper mill.

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Kimberly-Clark Corp. has declared a regular dividend of 60 cents a share, payable July 1 to stockholders of record June 12.

Minnesota & Ontario Paper Co. has declared a quarterly cash dividend upon its common stock of 50 cents per share, payable July 25 to shareholders of record June 30.

Northern Paper Mills has declared a regular quarterly dividend of $1 on the common stock, payable June 10 to stockholders of record May 20. A dividend of $1.50 on the 6½ per cent preferred stock was also declared, payable on the same dates.

Puget Sound Pulp & Timber Co. has declared a quarterly dividend of 50 cents a share on the common stock, payable June 30 to stockholders of record June 25.

River Raisin Paper Co. has declared a dividend of 20 cents a common share, payable June 20 to record of June 5.

Southern Advance Bag & Paper Co. has declared an extra dividend of 12½ cents, plus the regular quarterly payment of 25 cents on common, both due June 27 to record June 10.

Sutherland Paper Co. has voted quarterly dividends of 37½ cents a common share and $1.10 a share of cumulative preferred stock, both payable June 14 to record of May 16.

United Board & Carton Corp. has declared a dividend of $6 per share on the preferred stock and 25 cents per share on the common, payable June 10 to stockholders of record May 20.

Paper mill corporate changes

Bowater Southern Paper Corp. has announced that a bond issue of $37,500,000 has been entirely placed with a group of insurance companies. The bonds, carrying 4¾ per cent, and described as sinking fund first mortgage bonds, Series A, are to be delivered over a period of two years ending March 1, 1954. The funds are to be used in the British company's new newsprint plant at Charleston, Tenn.

International Paper Co. shareholders approved an incentive stock option plan for officers and key employees of the company and certain subsidiaries, which grants options on 250,000 shares of authorized but unissued common stock. No more than 20,000 shares of present common stock may be optioned to any one individual, and no options may be be granted after May 15, 1962, under the plan, which will be administered by directors.

Weyerhaeuser Timber Co. is offering through Blyth & Co. 5,000 shares of its common stock, priced at $68.50 a share, less a concession of $2 a share to dealers.

New York Exchange—Stocks

	Closing Prices June 19, 1952	May 20, 1952
A.P.W. Products	* 4⅞–5⅛	5¼
Celotex	17⅝	18⅜
Same Preferred	* 16½–16⅝	* 16¾–17
Certain-teed Products	15	15⅛
Champion P. & F. Co.	26⅛	24⅝
Same Preferred	100½	*103⅛–104
Chesapeake Corp.	* 29½–30⅛	* 28⅛–28⅝
Continental Diamond	12⅝	13
Container Corp.	34	32⅝
Same Preferred	101	*102–103
Crown Zellerbach	53⅛	51⅜
Same Preferred	103	101¾
Dixie Cup	34½	32½
Eastern Corp.	20⅜	21¼
Robert Gair	15⅝	15½
Same Preferred	19⅝	* 19½–20
Gaylord Container	32⅛	29⅛
International Paper	47	46⅛
Same Preferred	*102¼–103¼	*103⅝–104½
Kimberly Clark	* 44½–45	44½
MacAndrews & Forbes	* 41¼–42	42⅜
Marathon	24¼	23¾
Masonite	28	29
Mead Corp.	23¼	23⅛
Same Preferred	* 89¼–91	* 92–93
National Container	11⅛	10⅜
Rayonier, Inc.	29¼	26⅝
Same Preferred	34⅜	35¼
Scott Paper	53	50⅛
Same $3.40 Preferred	* 91–93¼	91
Same $4 Preferred	*103¾–106½	*102¼–106
St. Regis	20¼	19⅝
Same Preferred	* 94–96	* 94½–95½
Sutherland Paper	23¼	23¼
Same Preferred	106¼	104½–105
Union Bag & Paper	43⅞	45½
United Board & Carton	* 14½–14¾	* 15–15¼
United Wall Paper	3⅜	* 2⅞–3
Same Preferred	* 24⅝–25½	* 24½–25
U. S. Gypsum	115	112½
Same Preferred	177¼	177
West Virginia P. & P. Co.	74	* 74–75
Same Preferred	*108⅛–108½	108

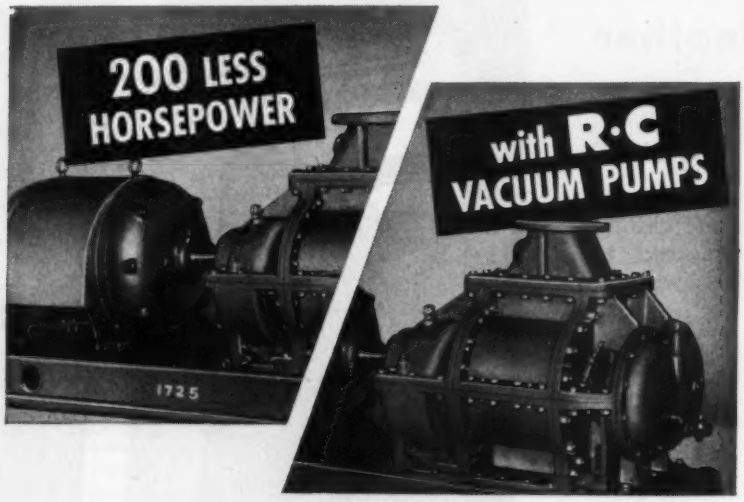
New York Stock Exchange—Bonds

Celotex 3¼%	.....	99⅝
Champion P. & F. Co. 3%	.....	.....
Mead Corp. 3%	.....	.....

New York Curb Exchange—Stocks

Am. Writing	.....	.....
Brown Co.	11⅜	11
Same $5 Preferred	105	.....
Same $3 Preferred	59	.....
Great Northern	54½	54
Hammermill	18	18¼
Puget Sound	28	27½

*Closing Bid and Asked Prices



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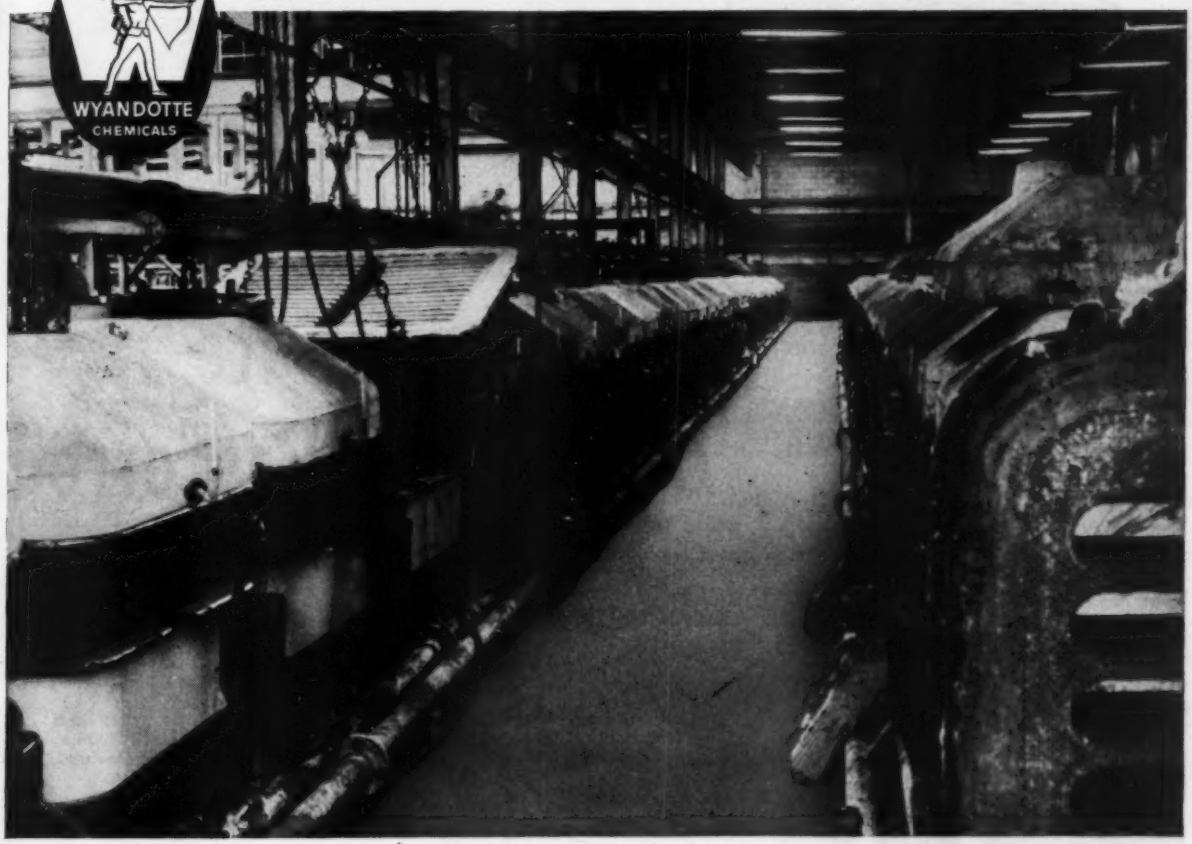

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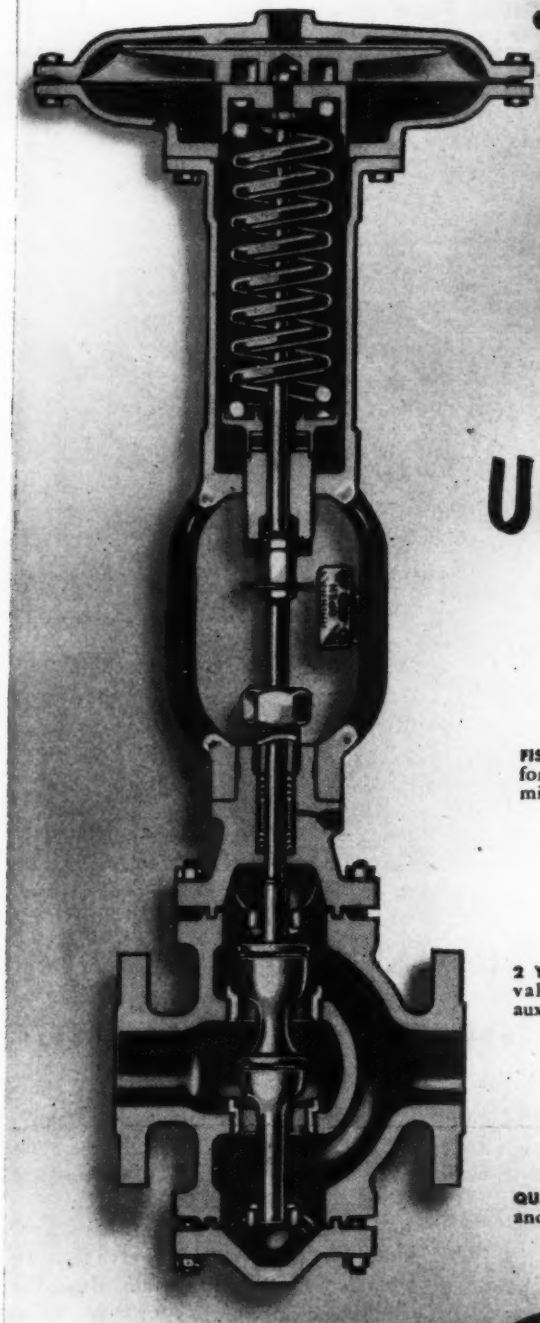

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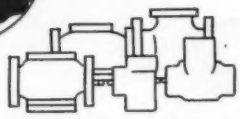

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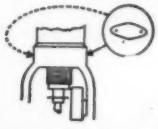

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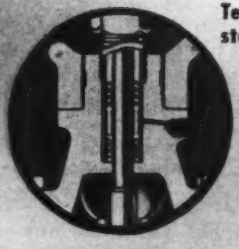

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News of the Industry

Congress Asked to Tackle Newsprint Supply, Price Problems

CONGRESS HAS BEEN ASKED to set up a joint House-Senate committee to seek ways to increase the production of newsprint. According to a bill introduced by Senator Case (R, S.D.), the purpose of the group would be to "formulate a national policy to meet the immediate and future newsprint needs of the United States." The committee would report to Congress by December 31.

Phases of the general supply problem that are to be investigated would include: further utilization of existing forest resources; use of fibre producing crops such as cornstalk; development of federally-owned water power sites in the Tongass National Forest of Alaska and elsewhere with the aim of making long-term deals with newsprint manufacturers; changes in laws and regulations governing loans by the government to manufacturers; changes to permit newspaper cooperatives to manufacture newsprint; reservation of some timber resources of the Tongass Forest for newsprint manufacture; a program to stockpile part of the newsprint produced with federal aid, and rationing or allocation of newsprint for the benefit of small publishers.

Price Problem

In the price phase of the over-all problem, Sen. Case called the high cost of newsprint a national issue, explaining that it has hindered to a great extent the low-cost distribution of information to the public. (The price of the paper, mostly imported from Canada, has risen more than 100 per cent since the end of World War II.)

In testimony before the House banking committee on the bill to extend the economic controls law, Price Stabilizer Ellis Arnall said that he has heard that the most recent boost of $10 a ton in the price of Canadian newsprint might force some newspapers to increase their advertising rates. "Lots of small papers are close to the breaking point now," he said.

At least three members of Congress have demanded that some form of "retaliatory action" be taken against Canada through the United States Trade Agreements Program because of last month's "outrageous" $10 per ton price increase in Canadian newsprint.

Presumably referring to the possibility of raising tariffs on some Canadian goods distributed in this country, Rep. Oren Harris (D., Ark.) said that he understood that "appropriate government officials are studying retaliatory action through the Trade Agreements Program." (The State Department has refused to comment on the possibility.)

Sen. Blair Moody (D, Mich.), pointing out that the U.S. receives about 80 percent of its newsprint from Canada, declared that it was "outrageous that the American press should be completely at the mercy of the monopolistic Canadian newsprint combine." Rep. Robert L. F. Sikes (D, Fla.) had protested the increase earlier and said that diplomatic officials "should let Canada know that this country takes a very dark view of this situation."

Text of Arnall Telegram

In connection with the information given Ellis Arnall, OPS director, by officials of the Canadian government that the $10 a ton increase in the price of newsprint had been authorized, Mr. Arnall sent the following telegram to C. D. Howe, Canada's minister of defense production:

". . . The proposed price increase of Canadian newsprint sold to American newspaper publishers is shocking and alarming. Representatives of the American Newspaper Publishers Association have conferred with me and I have also discussed the matter with some members of the United States Congress. All are very much concerned about the ten dollar per ton price increase. It is the consensus here that the increase is unwarranted and improper.

"During the last 20 years, 749 American daily newspapers have disappeared from operation through consolidations, mergers, and failures. This additional cost increase will drive many small American newspapers out of business and ultimately bring about increased costs to the American public. In the end, the Canadian newsprint industry will be injured rather than helped by reason of the price increase.

"I urge that the matter be revaluated and reconsidered and that the authorization for the increase be rescinded."

U. S. Price Not Affected

At Lufkin, Texas, an official of Southland Paper Mills Inc. has said that the $10 a ton price hike would not affect prices of newsprint manufactured in the U. S. That is because the Office of Price Stabilization ceiling is clamped on U. S. newsprint, the official declared. He declined to be quoted by name.

He said that Southland's $116 price represents the maximum under the ceiling, "and we have no plans to increase our price. What the Canadians do has no effect on Southland. We can't go up because of OPS ceilings."

Canada Explains Price Increase

The recent $10 a ton increase in the price of Canadian newsprint to U. S. consumers is to offset the loss of revenue through increased costs and the disappearance of the premium on U. S. money, according to spokesmen for the industry north of the border. The net to Canadians is not increased, they say.

Production Minister C. D. Howe has

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declared that the increase is reasonable and only partially offsets losses, as a $20 a ton decrease in income has resulted to Canadian manufacturers from changed exchange rates and increased production costs.

According to Harold S. Foley, president of Powell River Co. Ltd., his firm netted $2,679,000 on U. S. sales in 1950, when the Canadian dollar was quoted at 90 cents U. S. In 1951, when the Canadian dollar began to climb back to par and over, the net was $1,529,000. This exchange windfall, he declared, enabled the industry to absorb some of the rapidly increasing costs of production and expansion.

Price Increase Not Enough

H. J. Symington, chairman of the board, has told the recent annual meeting of Price Bros. & Co. Ltd. that production cost increases cannot all be met by adding to the consumer price of newsprint. There must be price boosts, he explained, but they cannot possibly take care of further increases in costs.

Mr. Symington pointed out that Price Bros. last year had its largest output and gross earnings in its history. However, he continued, net earnings were lower, amounting to $3.82 per share, as compared with $4.12 per share in 1950.

Commerce Department Sets Up 5-Point Newsprint Plan

The Department of Commerce has established a five-point program aimed at the expansion of U.S. newsprint production, according to an announcement from the House judiciary subcommittee headed by Rep. Celler (D, NY). The action by Commerce came about as a result of a report issued by the committee covering several years' investigation.

The report noted that Administration officials have set a goal of 494,000 tons of additional capacity over January 1, 1951, levels, and that to date the DPA has approved projects for 375,000 tons of this goal. The Commerce Department program is aimed, first of all, at making up this deficit.

Actions Contemplated

H. B. McCoy, assistant Secretary of Commerce, will undertake to head the program and is to give the subcommittee a progress report within two months. Actions contemplated in the five-point program are:

1. Exploration of the obstacles that have prevented the additional 120,000 tons of capacity from being proposed.

2. Consultation with present and potential producers in an effort to induce them to undertake new newsprint facilities to meet the expansion goal. The new producers are to include firms using new techniques, such as bagasse, hardwoods, and deinked newsprint.

3. Definite tests by the Bureau of Standards and other testing laboratories as to the value of these new techniques and processes.

4. Conferences with publishers and representatives of publishing groups in an effort to get these firms to give aid to new newsprint producers.

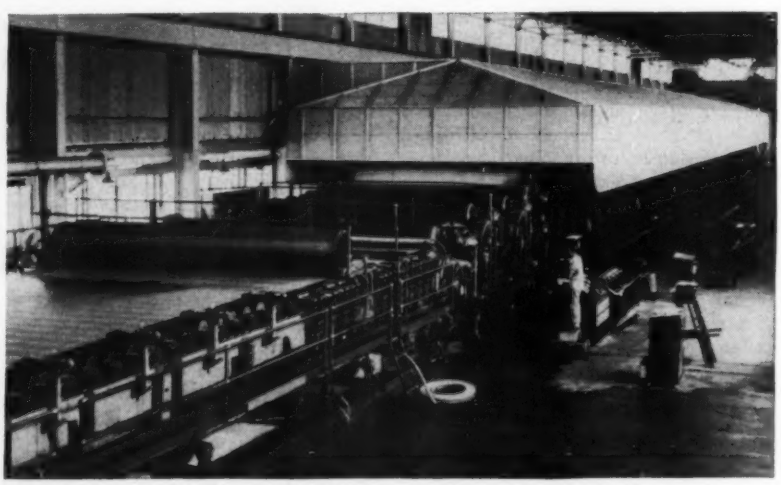
5. Coordination with other government agencies working on priorities, amortization, loans and other aspects of new production.

N. American Newsprint Output Continues at Record High

Production of newsprint in Canada (including Newfoundland) during the month of May amounted to 495,972 tons and shipments to 492,478 tons. Output in the United States was 103,440 tons, and shipments were 103,783 tons, making a total North American production of 599,412 tons and shipments of 596,261 tons, compared with continental production of 582,411 tons and shipments of 580,030 tons in May 1951. According to the Newsprint Service Bureau, total output in May exceeded that of any May on record.

The Canadian mills produced 87,637 tons more in the first five months of this year than in the corresponding period of 1951, which was an increase of 3.8 per cent. The output in the United States was 32,130 tons, or 7 per cent, greater than that in the first five months of last year, making a total continental increase of 119,767 tons, or 4.4 per cent, over the comparable period of 1951.

Stocks of newsprint paper at the end of May were 173,681 tons at Canadian mills and 8,626 tons at United States mills, making a combined total of 182,307 tons, compared with 179,156 tons April 30, 1952, and 156,145 tons at the end of May 1951.



GENERAL VIEW of No. 4 machine at Pensacola showing portion of fourdrinier wire, with machine tender at the control station; the entire length of the machine from slice to and including the rewinder is approximately 415 feet

St. Regis Florida Expansion Leads in Mill Construction Projects

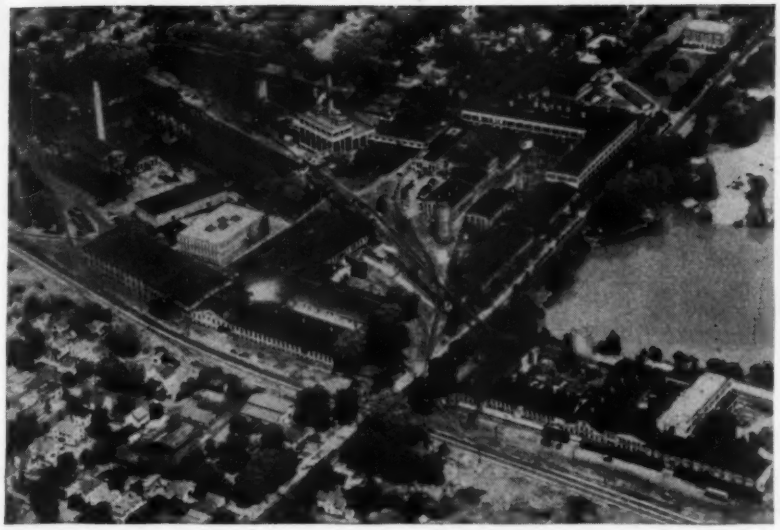
APPROXIMATELY 100,000 TONS of kraft paper and board per year is to be the production capacity of the new paper machine now in operation at St. Regis Paper Co.'s mill at Pensacola, Fla. The completion of the Pensacola construction project, including pulp mill expansion, has raised the firm's paper and board capacity there to 265,000 tons annually.

St. Regis has also reported "on-schedule" progress in the construction of its new kraft paper and board mill, including pulp manufacturing facilities, at Jacksonville, with present indications that production will begin in the fourth quarter. This mill, with a capacity to produce an annual 100,000 tons of kraft paper and board, will bring the yearly kraft paper and board capacity of St. Regis to 560,000 tons.

The new machine at Pensacola (No. 4) is designed to manufacture paper with a trim of 210 inches. Built by Bagley & Sewall Co., Watertown, N.Y., the machine has a wire 228 inches wide and 120 feet long for the fourdrinier section and was designed for a speed of 2,400 feet per minute.

Independent Mill

The special machinery, equipment, and structures to house them, to provide this added production, form practically



AIR VIEW of the St. Regis Kalamazoo mill; ground beautification has been an integral part of the rehabilitation project

a complete and independent mill unit, built adjacent to the existing structures and facilities of a 250-ton per day capacity pulp and paper mill unit originally built by and for Alabama Pulp & Paper Co. in 1947. That firm produced its first paper in March 1948. In December 1948 the physical properties of Alabama Pulp & Paper and Florida Pulp & Paper Co., whose mill had been operating on an adjoining site, were merged with and into St. Regis.

The over-all southern expansion program, now nearing completion, represents an important part of a long-range program projected by St. Regis that has as its aim the complete integration of the Kraft Division. In anticipation of this goal, the company has acquired over the years a permanent source of wood supply in four southern states.

Kalamazoo Rehabilitation

Progress in a long-range rehabilitation program being undertaken at St. Regis' Kalamazoo, Mich., paper mill is the subject of a report recently issued by the firm's New York offices. The project, say the officials, has permitted the firm to produce with the same raw materials and virtually the same equipment much higher grades of paper with more general uniformity.

According to the report, the management of the mill has concentrated its efforts on physical rehabilitation of the mill, improved personnel organization, and equipment and sales. Among improvements are the following: new cooking methods; new dirt removal equipment; reconditioning and rebuilding of paper machines; modernization of coating methods and equipment.

Scott Announces Soundview Paper Production Plans

G. W. Pepper, vice president of Scott Paper Co. at Everett, Wash., and Paul Baldwin, manager of the Chester, Pa., plant, have announced plans for paper production at the new mill of Scott's Soundview (Wash.) Division. The mill is to have two paper machines with a capacity of 175 tons daily. Its cost is to be between 15 and 20 million dollars.

Soundview eventually hopes to have six machines in operation, with a daily capacity of 600 tons daily and using the entire output of the pulp plant. Today, about 25 per cent of Soundview output goes to other Scott mills; when the Everett mill gets into production, the firm will claim about 50 per cent of the pulp produced.

A great savings will be realized through the new mill, Mr. Pepper declared. At present, Soundview hauls pulp east and finished paper west. The new paper mill will eliminate this cross-hauling and will strengthen Scott's position in the western market. The mill construction must be approved by the board of directors before construction can begin.

Construction Underway at Ketchikan Pulp Mill

The first contingent of construction workers, numbering 75, have arrived at Ketchikan, Alaska, to start work on the installation of the Territory's first pulp mill. According to Lyle F. Watts, chief of the U.S. Forest Service, the project will involve an investment of $45,000,000—the largest industrial enterprise in Alaska's history. Two years will be required to complete the plant.

The mill is being installed by Ketchikan Pulp Co., a new firm jointly controlled by Puget Sound Pulp & Timber Co. and American Viscose Co. It will produce high-grade dissolving wood pulp that will be shipped to the eastern seaboard for processing into rayon and cellophane in plants of the Viscose company.

Wood for the mill will come from the Tongass National Forest, which covers most of the densely timbered area of southeastern Alaska and is under the administration of the Forest Service. The timber-cutting contract held by the company provides for a 50-year supply of timber for a mill of 525-ton daily capacity. The initial plant will produce 300 tons per day, but the capacity is scheduled to be raised to the higher figure within a few years.

All logging is to be done in accordance with good forest practices as prescribed by the Forest Service. Salmon spawning streams and recreational and scenic features will be protected. The pulp mill is so designed as to prevent pollution of the tidal waters on which it will stand.

Colorado Project Certificate Extended

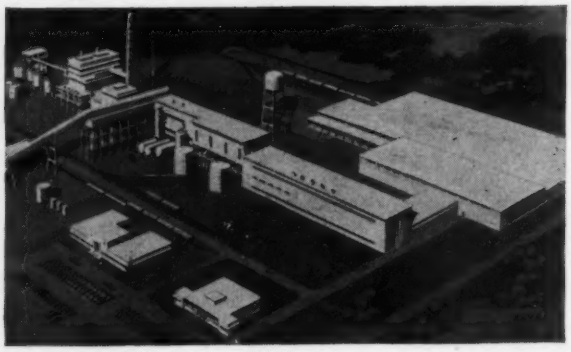
The Defense Production Administration has announced in Washington that the certificate of necessity for the proposed $20,000,000 plant of Columbine Development Co. on Colorado's western slope has been extended 90 days. Columbine hopes to establish a pulp and paper mill near New Castle.

Officials of the firm have declared that they have been assured by the U.S. Forest Service that a similar extension in time in which to negotiate a timber purchase contract is also forthcoming. Timber would be drawn from the White River Forest.

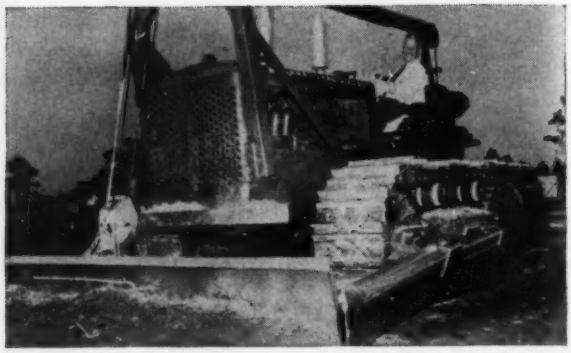
Bagley & Sewall Buys Pond's Tissue Division

Abe Cooper, president of The Bagley & Sewall Co. Inc., Watertown, N.Y., has confirmed his purchase of Pond's Extract Co. Tissue Division at Mechanic Falls, Maine. The purchase terms are not disclosed, but Mr. Cooper declared that he would continue operation of the mill under the management of Robert M. Young, Pond's executive vice president in charge of the Tissue Division.

The mill is equipped with three Yankee machines having a total production of approximately 50 tons of sanitary absorbent tissue and facial tissue papers daily. Formerly it was owned by Waterfalls Paper Mills, controlled by Mr. Cooper, and was sold by him to Pond's in 1944. As a result of that sale, Pond's rehabilitated the mill, purchased and installed a new 154-inch Bagley & Sewall fourdrinier with a production of 1,500 feet of tissue per minute, moved a 110-inch fourdrinier from Pond's Sey-



ARTIST'S SKETCH of the chemical cellulose plant that Rayonier currently has under construction at Doctortown, Ga.



MANNING A BULLDOZER, Clyde B. Morgan, Rayonier president, participates in ground breaking ceremonies at Doctortown

Rayonier Breaks Ground for Georgia Mill

Ground was broken recently in Doctortown, Ga., for Rayonier Inc.'s new $25,000,000 pulp mill. When completed sometime in 1954, the firm's fifth plant will produce 250 tons per day of chemically purified wood cellulose.

Approximately 450 people will be employed in the new facility, and an additional 500 will be required by contractors supplying pulpwood. It is expected that a daily 550 cords of wood will be consumed. Part will come from company-owned timberlands, while much will be purchased locally, creating another new market for wood in this southern area.

The Doctortown plant is Rayonier's major development in its $80,000,000 post-war expansion program, which began late in 1950. It will add 87,000 tons capacity to the firm's annual operations. If necessary, the plant will be able to produce nitration pulp for military explosives, as well as cellulose for standard textile yarns.

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mour, Conn., mill, and had Bagley & Sewall rebuild the machine that was in the Mechanic Falls plant, the latter machine having a width of about 90 inches.

St. Croix Launches Improvement Program

An extensive program of improvements has been undertaken by St. Croix Paper Co., Woodland, Maine, following a year in which the firm set production records in total output as well as in weekly and daily quotas.

The current project is designed to provide higher efficiency and greater speed without the addition of more machines. The chief item on the improvement schedule is a new boiler, which is expected to cost approximately $750,000. It is also hoped that the steel will be available this year for a groundwood stock tank of 550,000-gallon capacity. In addition, a new grinder is to be installed and a garage constructed. Equipment for stepping up machine production is planned.

National Container Georgia Project Construction Starts

At the present rate of site preparation for the 500-ton per day kraft pulp, board and paper mill that National Container Corp. is building near Valdosta, Ga., construction may begin this month on the foundations.

Clearing and outside grading of the 100-acre site was going forward at the end of June. As part of this initial work, Merritt-Chapman & Scott Corp., the builder, is constructing 1½ miles of sewers, approximately one mile of macadam roadway, 10,000 square yards of hardtop parking area, and a mile of 7-foot steel mesh fence.

The firm is building a 6½-mile spur from the mill site to the tracks of the Georgia, Southern & Florida Railroad (Southern Rwy.), and a tie-in with the Georgia & Florida Railroad is also under construction.

Other phases of the project now under way include the construction of a field office for M-C &S that subsequently will be turned over to serve as one of the mill's permanent facilities. Built of jumbo face brick, with concrete slab floor, it is of wood frame and steel sash construction. A machine shop of prefabricated steel construction and a diesel-powered generator that will similarly be turned over for permanent use also are now under construction and installation.

Kimberly-Clark Establishes Wallpaper Division

Kimberly-Clark Corp., Neenah, Wis., has announced the establishment of a wallpaper manufacturing division at its Atlas mill in Appleton. In connection with this action, the firm also announced that it had effected a consolidation with Katzenbach & Warren Inc. through the exchange of common stock. The latter company has for many years been nationally known as an independent wholesaler of wallpaper. The Appleton property will be completely re-equipped, and it was also reported that plans for further expansion are contemplated. Manufacturing is to begin this fall.

Future status of the mill has been under consideration since a recent decision to discontinue manufacturing on a contract basis. By consolidating Katzenbach & Warren as a full part of its Appleton mill, K-C will have for the first time a completely integrated wallpaper operation.

Katzenbach & Warren has business offices and warehouse facilities in New Caanan, Conn. A principal showroom is located in New York, N.Y. Sales outlets are maintained in New York, Boston, Philadelphia, Chicago, Dallas, and Los Angeles.

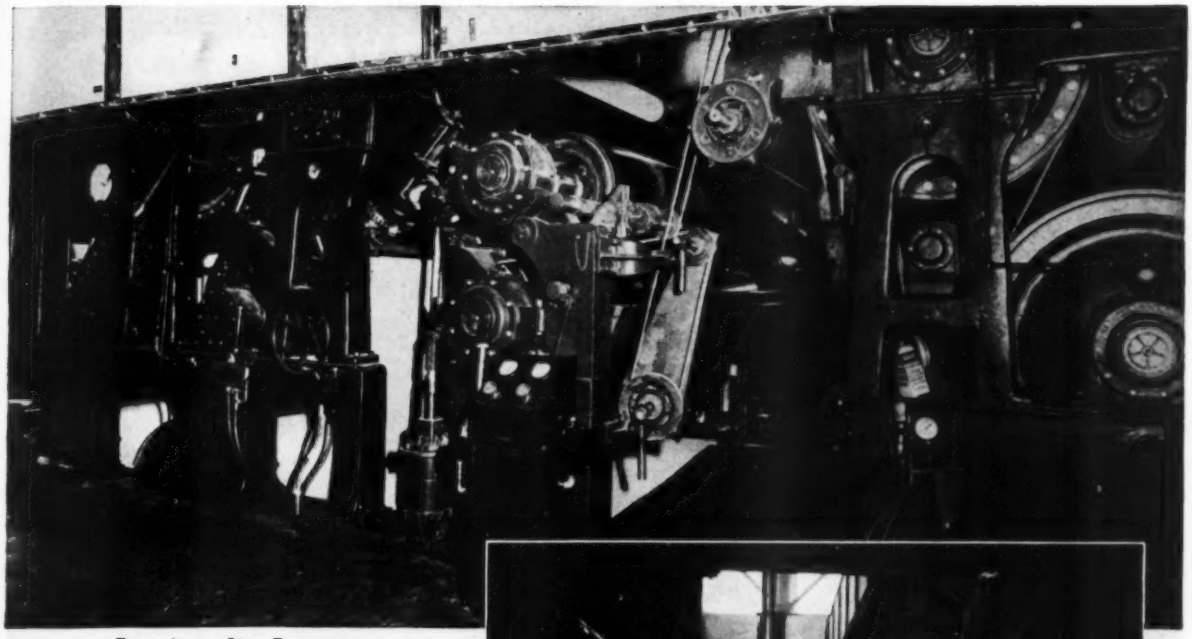
The Appleton mill has been the country's major source for exclusive decorator wallpapers. The mill will continue such specialized production, but plans are also being made to add a popular-priced line.

The announcement from Kimberly-Clark declared that one major reason for continuing the Atlas mill in wallpaper production was to keep long-experienced personnel in trades that are commensurate with their skills. After the mill is completely re-equipped with the latest type of wallpaper machinery, the corporation indicated that there are plans for further expansion and diversification of mill production.

National Gypsum Builds New Executive Offices

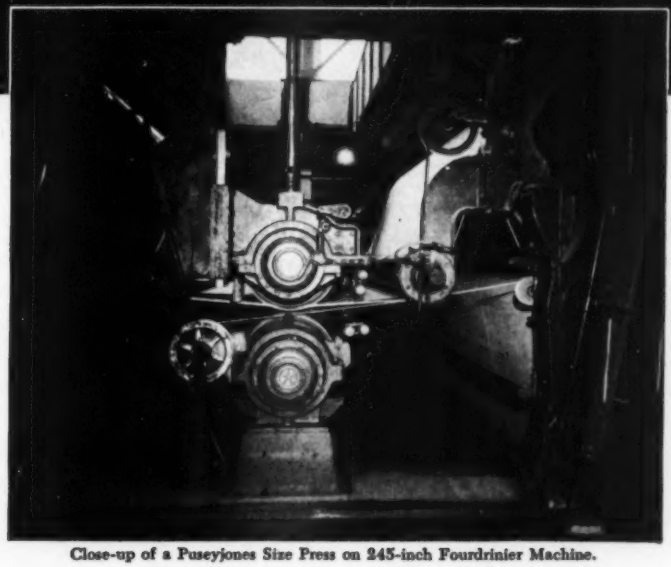
National Gypsum Co., Buffalo, N.Y., has broken ground for a $750,000 addition to its executive offices. The project, which will increase the firm's office space by 75 per cent, is scheduled for completion in about a year.

The three-story, 78 by 111-foot annex at the rear of the present headquarters will provide an additional 30,000 square



Puseyjones Size Press on 122-inch Fourdrinier Machine.

Better Surface Sizing Pays for itself



Close-up of a Puseyjones Size Press on 245-inch Fourdrinier Machine.

In every mill making Bond, Ledger, Writing, Mimeograph and similar papers, a Puseyjones Size Press will pay for itself in dependable performance at top running speeds. On machines ranging in width from 84 inches to 245 inches, results are outstanding, including:

(1) Positive non-glare surface without production "slow-down"

(2) Excellent erasing qualities

(3) Proper stiffness and snap for easy handling

(4) Greatly improved surface to take ruling, printing, writing with pen or typewriter, or carbon copying

Size Presses are also being installed on machines making Kraft Bag and Specialty papers.

The addition of a new Puseyjones Size Press is only one of many improvements designed to give better production, better profits. Our engineers will gladly work with you to find the exact solution to your paper-making machinery problem.

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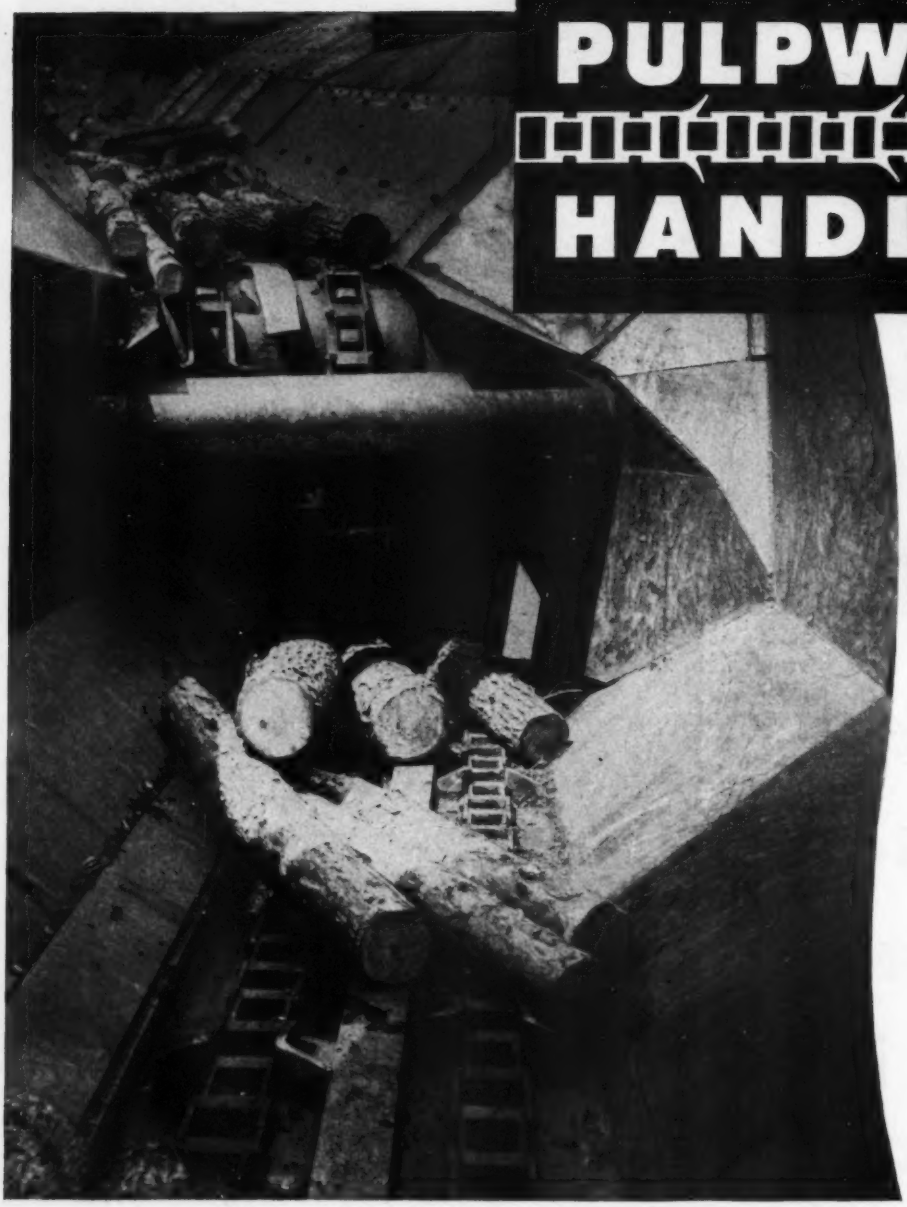

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Jeffrey Chain Conveyors are built to take severe punishment—the constant impact of falling pulpwood like you see here. Jeffrey PW 132 chain with S-212 Spurs, designed especially for this type of work, is shown above. Let us tell you about it.

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Jeffrey Mfg. Co. Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

feet of space, including a sufficient area in the basement for the protection of 2,000 people against possible bombing attack. It is believed to be the first downtown office building in Buffalo to incorporate an air raid shelter in its design.

Marinette Paper Announces $500,000 Expansion

Marinette Paper Co., Marinette, Wis., has awarded a contract for approximately $500,000 for the construction of a new converting plant to the Edward R. Meyer Construction Co. of Oshkosh. Construction of the 71,000-square-foot building is to be started in the near future, with completion scheduled by early spring.

The project, which will be located directly south of the present mill, will result in the concentration of the firm's entire manufacturing process. At the present time, the converting plant is located some distance away from the mill, and unfinished paper stock must be transported by truck. The structure, roughly L-shaped, will be one story high, of brick veneer backed by concrete blocks.

CANCO Expands Oregon Plant

Oregon's first complete paper milk container manufacturing operation is being installed by American Can Co. at its present Portland can-making plant. In full operation the installation will have a rated capacity of 200,000,000 containers annually in quart, pint, and half-pint sizes. More than 100 men and women will be employed.

CANCO has also announced the creation of a new Packaging Development Division as a part of the general sales department. The new division will serve as a coordinating agency between sales, manufacturing, research and other company departments.

Expansion Notes

Rayonier Inc.
has announced the purchase of a huge stand of timber on the Quinault Indian Reservation on Washington's Olympic Peninsula. The firm bid $6,473,000 in Indian Forest Service bid openings for permission to log 615,000,000 board feet from 35,000 acres during the next 33 years under a sustained yield program.

Birmingham Paper Co.,
Birmingham, Ala., has announced completion of the modernization of its boiler system. New facilities were installed providing for gas firing instead of coal; boiler feedwater, steam, and condensate systems were thoroughly modernized. Corrugating machinery was relocated. Contractor for the project was Rust Engineering Co., Pittsburgh.

Great Northern Paper Co.
has been granted rapid tax write-off privileges for its proposed $30,000,000 newsprint plant at Millinocket, Maine. The new mill is planned for the production of 124,000 tons annually. It was the eighth newsprint project approved since February 19. Such projects when completed will produce 375,000 tons a year, or about three-fourths of the 494,000-ton increase in yearly domestic production which the government is seeking.

7,000,000 Tons of Output
may well be reached by newsprint manufacturers in the United States and Canada this year. This was the view expressed by Vernon L. Tipka, secretary of the Newsprint Service Bureau, as he addressed a session of the national meeting of the American Pulp and Paper Mill Superintendents Association June 18 at Detroit. He further said that "the tax burden borne by newsprint paper ranges from $20 to $30 per ton and is likely to go higher."

Sterling Pulp & Paper Co.,
Eau Claire, Wis., has received from the DPA a certificate of necessity permitting a fast amortization of new equipment. According to the firm, the certificate allows the writing off for tax purposes in five years 30 per cent of the cost of facilities for pulp, paper, and paperboard production. The total cost has been set at $3,313,071.

Continental Can Co.
may purchase approximately 270,000 acres of land in eastern North Carolina from Roper Realization Co., Norfolk, Va. The cost is to be $17.50 per acre, less brokerage commissions. Continental has been buying land for some time to provide wood for its pulp and paper mills.

Crown Zellerbach Corp.
has announced that construction of a locker room accommodating 300 employees is under way at its National Paper Products Division in Carthage, N.Y. Besides locker facilities, the addition will increase the size of an existing lunch and meeting room.

St. Regis Paper Co.
announces that its new multiwall bag plant at Tacoma, Wash., is now in production, replacing the leased plant that the firm formerly operated in Seattle. Occupying 81,600 square feet of floor space, the new plant has been built adjacent to the kraft mill and provides a completely integrated operation.

Olin Industries Inc.,
East Alton, Ill., has announced the formation of the Forest Products Division, with headquarters in Shreveport, La. It is Olin's eighth operating division, and will be responsible for the operation of properties and facilities in Arkansas, Louisiana, and Texas.

Hammermill Paper Co.,
Erie, Pa., has been issued a building contract with the city for a $16,865 addition to a boiler house at its East Erie plant.

Perry Envelope & Bag Co.
has erected a factory building in New York, N.Y. PEBCO's new headquarters is equipped with the latest in printing and bag-making machinery.

Crown Zellerbach Corp.'s
Camas, Wash., specialty mill will squeeze out another 52 tons of paper products daily without adding a paper machine. The increase in production will be achieved by a speed-up of four of the 15 machines now in operation. The firm recently announced that it would postpone construction of a $19,000,000 addition to the Camas pulp mill, because demand doesn't warrant the project. F. A. Drumb, resident manager, said that C-Z will definitely build the mill elsewhere in the Northwest.

Buffalo Envelope Co.,
Buffalo, N.Y., is planning a $200,000 expansion at its plant. The firm will construct a 25,000-square foot addition to existing facilities.

United Board & Carton Corp.
has moved into its new home office at 2 Park Ave., New York, N.Y. The firm's headquarters had been located in Syracuse for more than three years. A principal office, however, is being maintained in Syracuse.

The Mead Corp.
has announced plans to build a new finishing and warehouse building adjoining its present plant facilities at Chillicothe, Ohio. The expansion is the result of a shift of some production from magazine paper to business and bond papers and will entail the employment of 200 additional workers.

Lily-Tulip Cup Corp.
has started operations at its new paper cup and container plant at Springfield, Mo. Enclosing a 10-acre area, the new industrial unit houses manufacturing facilities, offices, and warehouse under one roof and is situated on a 100-acre site. In full operation, the plant will employ between 1,500 and 2,000 people.

Gardner Board & Carton Co.
has announced that its new $2,000,000 retail box plant in Lockland, Ohio, is now in full operation.

Marathon Corp.'s
three-year building and equipment expansion program for its food package

manufacturing plant at Wausau, Wis., is now under way. Foundations were poured in June for a new shipping and receiving warehouse. Construction schedules call for occupancy by late December. Of steel and concrete fireproof construction, the warehouse will consist of one story and a basement and will be 168 by 442 feet in size.

Weyerhaeuser Timber Co. may venture into the wood-chemical field. It has a 60-day option to sublease a government-owned alcohol-from-wood waste plant at Springfield, Ore., now being operated by Oregon Wood Chemical Co.

Mando Celebrates 42nd Anniversary

On June 6 Minnesota & Ontario Paper Co. marked the 42nd anniversary of its founding. In those years the firm has turned out more than 6,500,000 tons.

Just under 18 tons of paper were made at the International Falls, Minn., mill on June 6, 1910. Today, the high-speed machines at International Falls, and Fort Frances and Kenora, Ont., produce a daily 945 tons. The break-down for the 42 years according to mill is as follows: International Falls, 2,397,580 tons; Fort Frances (started in 1914), 2,234,030 tons, and Kenora (started in 1924), 1,981,046.

Mando was started by E. W. Backus, a Minneapolis lumberman. Mr. Backus secured logging rights in the area and received permission to build a dam across the Rainy River, the boundary line between Minnesota and Ontario. In addition to the paper mill at International Falls, he constructed a saw mill capable of producing 50,000,000 board feet a year. Rainy River Improvement Co., a member of the Mando family, began providing electric power to the young community as early as 1910. Started first as a logging railroad, the Minnesota, Dakota & Western Railway Co. has been a Mando subsidiary since the beginning.

Eastern Corp. Elects Holden President

Harold Holden was elected president and director of Eastern Corp., Bangor, Me., on May 29, succeeding Clyde B. Morgan, who resigned last July to become president of Rayonier Inc. Upon Mr. Morgan's resignation, Ira D. Wallach was elected executive vice president to act temporarily as chief executive officer pending the selection of a new president of the corporation.

Harold Holden

Mr. Holden has been connected with the paper industry since 1919. After serving in the Chemical Warfare Service in the First World War, he joined Falulah Paper Co. as chief chemist. In 1921, he became part owner and New England manager of Paper Makers Chemical Co., since merged with Hercules Powder Co. In 1936, he joined Oxford Paper Co. as sales manager, and in 1948 became vice president in charge of sales, which position he resigned to accept the presidency of Eastern Corp. He also served Oxford Miami Paper Co. as a director, as well as vice president in charge of sales. He is active in association affairs.

A native of Fitchburg, Mass., Mr. Holden's education was acquired at Lowell Technical School and Massachusetts Institute of Technology.

Massey Machine Coating Patent Ruled Invalid

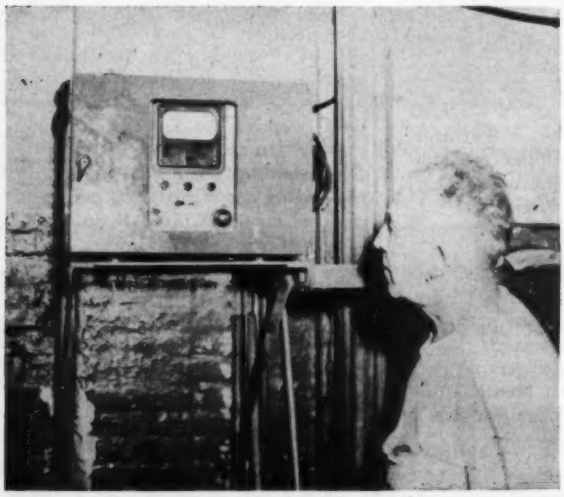
In the case of Consolidated Water Power & Paper Co. and Peter J. Massey vs. Kimberly-Clark Corp., Judge Robert E. Tehan, U.S. District Court for Eastern Wisconsin, has found that, "the Court is of the opinion that the defendant has not infringed the plaintiff's patent, No. 1,921,368, and that the plaintiff's patent 1,921,368 is invalid.

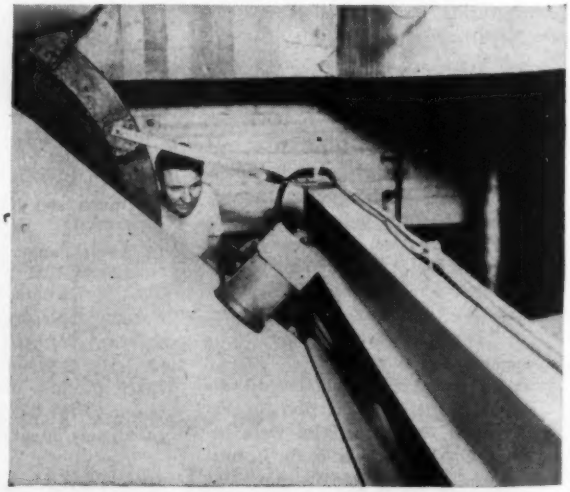
Issued on August 8, 1933, to Massey, the patent expired in 1950. It covered what might broadly be termed the application of coating color by an offset printing method. Action was started May 3, 1947, and was followed by another action on July 21, 1949. Both were joined and came to trial, without jury, February 21, 1950. The full decision will be filed by the judge at a later date.

Railroads Accept Paper Bags for Grapefruit

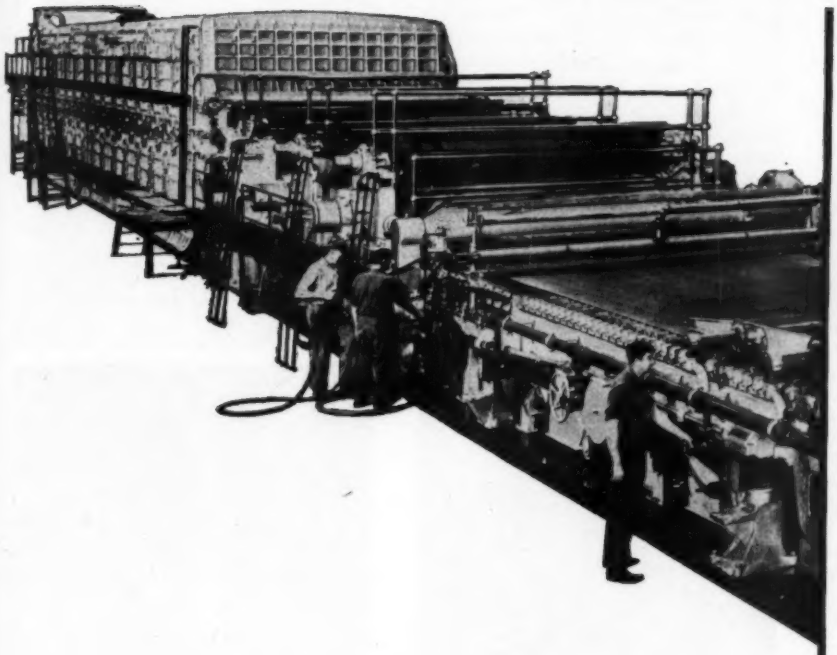
Grapefruit has been added to the long list of produce items that now go to market in paper bags. Union Bag & Paper Corp. reported at the recent Packaging Exposition staged at Atlantic City, N.J., that the railroads have authorized its 4/5 bushel grapefruit bag as an acceptable container. Acceptance follows the success of commercial test shipments of Florida grapefruit in paper bags last season. More than 150 carloads and numerous truckloads were shipped during that time.

This new economical method of shipping grapefruit results from the joint efforts of Union Bag & Paper and At-





BETA RAY GAUGE recently installed at Gilbert Paper Co., Menasha, Wis., which provides remarkable accuracy in checking the weight and density of paper as it is being made. The unit consists of two principal parts: an open "C" frame gauging unit and a control panel (left) that contains the indicator. The "C" frame is mounted on the paper machine so that paper coming off the last drying roll passes through it (right), where a detector head receives the Beta Rays. By measuring the amount the rays diminish as they pass through the paper from the source to the detector, a continuous reading—accurate to 0.5 per cent—is obtained. The radioactive material used is Strontium 90



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lantic Commission Co. Their solution took the form of a specially constructed bag made from three layers of wet strength paper. A series of perforations in the bag provide the necessary ventilation. The fruit arrives at its destination in a condition that is comparable to fruit shipped in conventional containers.

Figures from last season's controlled shipments showed savings in container costs ranging from $47 to $75 per car. In addition, savings in freight charges were estimated at from $13 to $16 per car. Savings vary, depending on quantities of bags used in each carload shipment.

Paper Firms Active in Fellowship Awards

Numerous paper manufacturers have shown increased interest in the granting of fellowships and scholarships to deserving youth.

The Kimberly-Clark Foundation Inc. recently received its first project, as Kimberly-Clark Corp. turned over to it the fellowship program that was started in 1946. The program, which involves grants to students doing graduate work, will remain the same as in the past except that henceforth it will receive its funds from the Foundation.

Fellowships are to be awarded this year for graduate study in chemical engineering at the Massachusetts Institute of Technology; in economics at Notre Dame; in forestry at the University of Minnesota, and in chemical engineering at the University of Wisconsin. The Foundation will also continue K-C's contributions to the scholarship fund at the Institute of Paper Chemistry.

The Foundation grants fellowships on the recommendations of a committee made up of H. A. Rothschild, assistant to the vice-president in charge of manufacturing; R. W. Lyons, vice president and director, and W. H. Swanson, assistant vice president and director of the Research and Development Department. Mr. Rothchild is chairman of the committee. Follow-up work on the fellowships will be handled by James Shipman, superintendent of process development; J. B. Millar, chief forester; W. H. Clifford, director and vice president in charge of finance, and Mr. Lyons.

Scott Establishes Award

Scott Paper Co. has announced the establishment of the U. M. Dickey Award carrying a two-year scholarship at the College of Forestry at the University of Washington. The scholarship provides $1,000 per year for a student of forestry during his junior and senior years; the award will be made for five consecutive years beginning with the 1952-53 academic year.

The award was established to honor U. M. Dickey, one of the founders and until recently president of Soundview Pulp Co. Mr. Dickey is now a vice president of Scott and its senior member of the board on the West Coast.

Celanese Corp. of America has established 13 new fellowships and two post-doctorate fellowships in 12 educational institutions for the 1952-53 year. Seven of the grants are for advanced study in chemistry, three in chemical engineering, two each in mechanical engineering and physics, and one in plastics.

Winners of the 1952 Gardner Board & Carton Co. Scholarships were announced recently in Middletown, Ohio. Each of the winners will receive $500 a year for four years of college. Four high school seniors were selected—two from Middletown and two from the Lockland-Reading-Greater Cincinnati area. More than 75 applied.

Marathon Corp., Menasha, Wis., has awarded its $3,000 college engineering scholarship to an 18-year-old Wausau high school senior. First of a series of annual educational awards sponsored by the firm, the scholarship permits the student to attend any approved engineering school of his choice for four years.

STORAGE SILOS in last stage of construction; the mill was to be ready to produce newsprint June 1, with official opening set for September 16

HUGE NEWSPRINT machine at Elk Falls as it appeared just prior to completion of main installation; the machine motors were operated on trial in May

Elk Falls Operations Lead in Canadian Expansion Story

PLANS WERE SET late in May for a June 1 start-up of the new Elk Falls Co. Ltd.'s newsprint mill at Duncan Bay on Vancouver Island, B. C. The estimated output of the one-machine operation is 240 tons per day. It is hoped that this will eventually reach a daily 320 tons. Approximate cost of construction is $40,000,000.

The new firm was formed by Canadian Western Lumber Co. Ltd. and Pacific Mills Ltd. Ninety-five per cent of the voting stock of the latter firm is owned by Crown Zellerbach Corp. Pacific Mills has entered into a contract with Elk Falls to supply chemical pulp from its plant at Ocean Falls at cost for a period of 10 years. The pulp is to be handled by water transportation over the 200 miles to Duncan Bay's naturally sheltered harbor, which is well suited for log booming grounds. Water shipment is year-round.

Of the pulp requirements for the new mill, 75 to 80 per cent is to be groundwood, while 20 to 25 per cent is to be chemical. Canadian Western Timber Co. Ltd., which holds forest management license No. 2 in British Columbia, has entered into a contract to sell pulpwood at cost to the plant for 10 years and after that time at the market price. Pulpwood to be supplied will be salvage and small diameter wood which is in good supply and not suitable for lumber.

Crown Zellerbach, for a minimum period of 10 years from the beginning of operations, will purchase at least 60,000 tons of newsprint annually, according to an agreement entered into by the firms. This is from an initial production estimated at 74,400 tons yearly.

Equipment Shipped by Water

Equipment and materials were shipped to the project site by car barge and were received at a 480 by 87-foot warehouse adjoining the paper machine room. The warehouse was one of the first buildings completed during construction. A completely equipped repair shop and an attached store were in operation in May.

Two boilers will develop 650 pounds pressure and supply a combined total of 170,000 pounds of steam per hour. A 400-foot main dock with a 360-foot storage shed, a car ferry slip and a scow dock have been completed.

COMPLETELY MODIFIED conveyor system for ship handling to storage and to the digesters is one of the features of Powell River's current $25,000,000 project

FROM A DISTANCE the modifications to the digester building required by the conveyor changes can be seen clearly; note the huge truss recently raised

NEW BOILER HOUSE at Powell River is being constructed adjacent to the old power house (right); community buildings may be seen at the rear in this photograph

The John Hart power development at Campbell River will supply Elk Falls with electric power under a 20-year contract. Water is to be taken directly from Campbell River for the boilers, which are fired with hogged fuel, with oil auxiliaries. Sawmill waste will be available under a 25-year contract with Canadian Western Lumber at cost for at least 10 years and at market thereafter.

Official opening will not take place until September 16, when it is expected that everything will be running smoothly.

Canadian Operations Likely to be Curtailed

The pulp and paper companies across Canada will likely curtail their woods operations somewhat during the coming 12 months, according to a statement made recently by W. A. E. Pepler, manager of the Woodlands Section of the Canadian Pulp and Paper Association.

"The pulpwood harvest for the wood year ending May 31 will run to a total of some 14,000,000 cords, the highest on record," Mr. Pepler declared. While the firms will not finally determine their pulpwood needs until July, nevertheless all reports from individual companies at present indicate that the over-all cut in 1952-53 will certainly be curtailed.

Meantime, owing to the larger cut in 1951-52, the over-all pulpwood inventory position of the industry was characterized by Mr. Pepler as being "comfortable." In short, the industry has sufficient supplies of its raw material.

As to the ability of the woodlands of the pulp and paper industry to maintain the larger cuts necessitated by the post-war demand for pulp and paper, Mr. Pepler declared that 10,000,000 cords of last year's record cut came from the 158,000 square miles of limits leased by the mills. "This works out," he said, "at less than a tenth of a cord, or 8½ cubic feet, per acre; and all scientific data compiled to date by ourselves and by government foresters reveal that the average annual growth exceeds this cut, plus the loss by fire, insects, and disease in the leased areas."

Powell River Modernization Features New Wharf Storage

A new, ultra-modern warehouse has recently been constructed at Powell River Co. Ltd. in British Columbia. P. M. Hunter, wharf superintendent, selected three mill veterans to move the first load of paper into the new sheds at a recent unofficial opening.

The capacity of the wharf storage is 10,000 tons. The warehouse is separated into deep-sea and coastwise storage buildings. The outer wharf, with berthing facilities for ships of 410 and 480 feet, has a 6,000-ton capacity warehouse. At the landward end a 4,000-ton shed has been built with berthing accommodations for the simultaneous docking of two 150-foot scows and one small motorship.

The average daily newsprint production at Powell River is more than 1,000 tons. The mill formerly held the world's record for daily output at 1,049.7 tons but recently broke this by turning out 1,051.1 tons.

New Type Log Raft Successful in B. C.

During the past month three rafts of logs have been successfully towed hundreds of miles down Canada's Pacific Coast using the C-9 Hook, which was devised by Bill Meighan of Portland, Ore. (see THE PAPER INDUSTRY for June). The first bundle raft of pulpwood, shipped by Columbia Cellulose Co. Ltd., was worth $50,000 and arrived in excellent condition at Prince Rupert, B. C., from Negei Island, south of Queen Charlotte Sound. Weather conditions were bad, but no loss of logs was sustained.

Columbia Cellulose has developed a new system for long-distance towing, using extra-heavy weaving cables wound over and under the truck-load size bundles and utilizing the Meighan hook to hold the bundles together.

A second raft has arrived at Prince Rupert and a third at Vancouver from Prince Rupert, taking only 14 days, including two days of bad weather. General opinion among log-towing experts on the West Coast is that the new type raft will withstand four or more times as much weather as an ordinary flat raft. The third raft contained 1,000,000 feet, consisting of 12 sections, each comprising 18 bundles of 20-foot cedar logs.

Marine insurance agents are reported pleased with the successful results of these experiments. They believe that risk has been greatly reduced, and operators claim that insurance charges are reduced by as much as 50 per cent. The saving from handling and towing in this manner is about $1.50 per thousand.

Canadian Notes

The 600-ton B-F,
a St. Lawrence River pulpwood carrier, was given up for lost recently, together with its crew of 10, two weeks after setting out on a stormy trip from a Gaspé peninsula port. Lifesaving equipment washed ashore and floating pulpwood were the only clues to the disappearance of the little steel-hulled vessel.

Newfoundland Wood Pulp
would be purchased by Canadian and United States paper firms were a new mill to be established there. The information came in answer to a survey by Newfoundland Labrador Corp. as to what wood products the two countries would be interested in.

University of New Brunswick
is establishing a $600,000 forest biology laboratory to help the fight against for-

est diseases. The new building is now under construction. It has been estimated that insects and plant disease in Canada alone cost an annual 500,000,000 cubic feet of timber.

Celgar Development Co. Ltd.,
an affiliate of Columbia Cellulose Ltd., has been granted a forest management license by the British Columbia government. Celgar plans a $65,000,000 integrated forest industry in the Arrow Lakes district of the Kootenays, about 300 miles east of Vancouver. The license covers 1,000,000 acres of forest for new materials for a sulphate mill, newsprint mill, and sawmills to employ about 2,200 workers.

Powell River Co.
and Aluminum Co. of Canada Ltd. are expected to reach an agreement in the near future on the possibility of establishing a pulp and paper project jointly at Kitimat, B. C. Harold S. Foley, president of Powell River, told a recent shareholders meeting that a "favorable decision" on the application for a forest management license in the area is expected soon.

New Brunswick International
Paper Co.'s Dalhousie mill has set a new daily production record for Canada with an output of 850 tons on May 8. The previous record was established June 1, 1951, when 838 tons were produced.

A Total of $820,945
was contributed by the federal government to seven provincial governments for forest inventory and reforestation programs during the fiscal year ended March 31. These contributions are made in accordance with an arrangement announced in the House of Commons last year. Benefiting under the agreement were New Brunswick, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia.

Forest Products
led in Canadian exports during 1951. Newsprint, wood pulp, planks, board and pulpwood to the value of about a billion and a quarter dollars were sold out of the country. This amount was nearly twice the revenue realized from the export of wheat, wheat flour, and other grains. It represented an increase in value over 1950 exports of about 25 per cent.

Heavy Damage
was caused to Irving Pulp & Paper Ltd., Fairville, N.B., recently when a two-alarm fire destroyed the roof of the main mill and gutted the chiploft. Company officials made no estimate of the damage. An indefinite shut-down was expected as a result of the fire.

Industry Notes

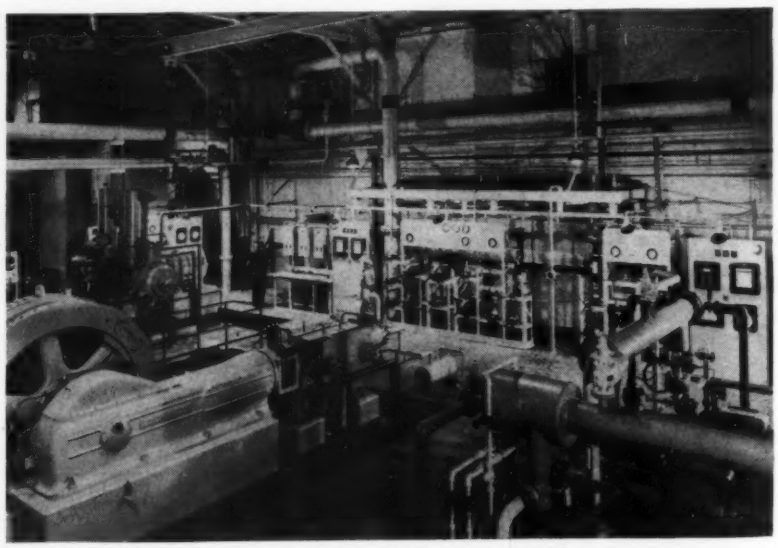
Nekoosa-Edwards Paper Co.,
Fort Edwards, Wis., has transferred its wholly-owned subsidiary, Nekoosa-Edwards Light & Power Co., to the Wisconsin Power & Light Co. According to John E. Alexander, president and general manager of Nekoosa-Edwards Paper, "... because the two operations are somewhat foreign to each other and each requires special executive and management time, it was felt that electric distribution to the public could be better handled by a company which specializes in this type of business." Under the terms of the transfer agreement, present employees of Nekoosa-Edwards Light & Power will be assured of employment with Wisconsin Power & Light, with full seniority and retirement allowances.

Atlantic & Danville Railroad
and the Southern Railway System have been granted permission by the State Corporation Commission of Virginia to charge higher rates for certain intrastate pulpwood shipments. With one restriction, the roads are authorized to apply a "combination" tariff in place of the current single line rates for pulpwood shipments on the A&D.

"Erratic Business Conditions"
have forced the virtual shutdown of Rushmore Paper Mills Inc. plants at Natural Dam and Gouverneur, N.Y. George W. Schildge, general manager of the firm, has asserted that the layoff is "temporary," although he does not know when the plants will resume full operations.

Beach & Arthur Paper Co.,
Modena, Pa., has changed its corporate name to Modena Paper Mills Inc., effective July 1. The executive offices of the firm are in New York, N.Y.

A Bill to Approve
the participation of certain Canadian provinces in the northeastern interstate compact for cooperation among the states for forest fire protection has been passed by the House and sent to the Senate.



INTERIOR of Hooker's new Tacoma, Wash., anhydrous ammonia plant

Hooker Opens Tacoma Plant

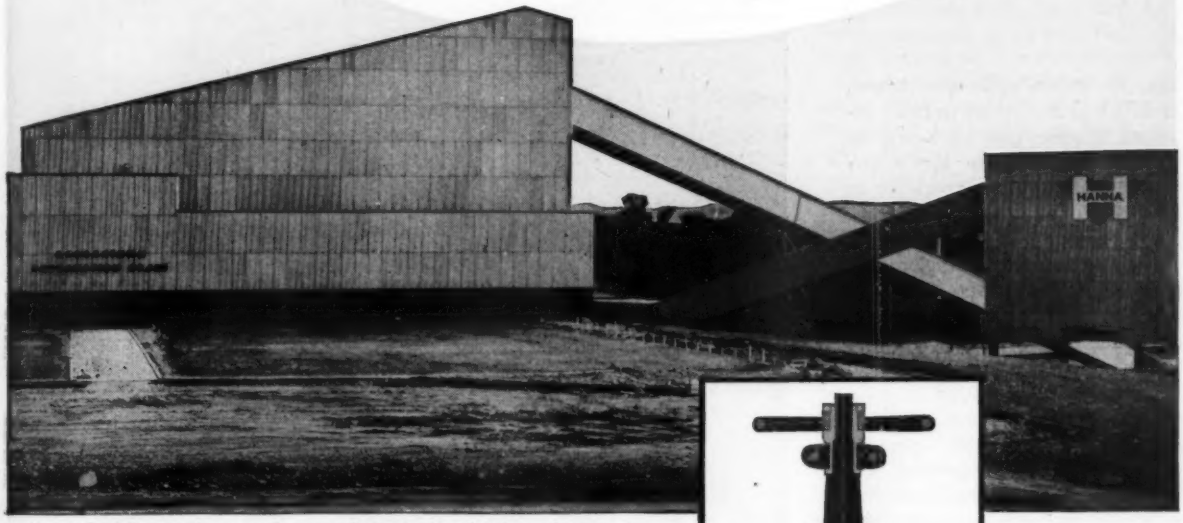
The $2,000,000 anhydrous ammonia plant of Hooker Electrochemical Co. at Tacoma, Wash., began operations recently. The unit was constructed to serve the growing requirements of the chemical industry and the pulp and paper mills of the Pacific Northwest. Its entire production has been contracted for and plans are already under consideration to increase its capacity by 50 per cent. The output of the plant for the time is shipped by tank car.

Hydrogen required for the process is obtained from Hooker Type S and S-3 electrolytic cells, which convert salt brine into caustic soda, chlorine and hydrogen. Nitrogen is obtained from the air by means of liquefying equipment supplied by L'Aire Liquide of Montreal. Design and construction of the plant were supervised by Chemical Construction Corp.

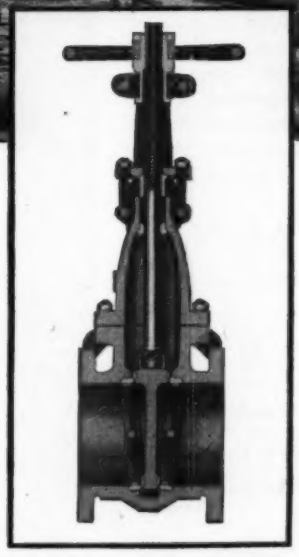
According to a recent report appearing in the *Vancouver* (B.C.) *Province*, Hooker, with home offices at Niagara Falls, N.Y., plans to build a $12,000,000 chemical plant in British Columbia. Company plans, the newspaper said, call for production of chlorine and caustic soda for the pulp industry.

H. K. Ferguson Co. has been awarded the construction contract for the $10,000,000 chlorine-caustic plant that Hooker is to construct at Montague.

Hanna Coal Company Preparation Plant ... served by the OIC LONG LINE of valves



Hanna Coal Company's mammoth new coal preparation plant in service now at Georgetown, Ohio.



"We've standardized on OIC Valves; all kinds for all kinds of service. They're the best!"

Hundreds of OIC Valves—iron, bronze and steel—were used in this coal preparation plant, completed just a year ago. OIC Valves were selected by Hanna Coal Company after many years' experience with these valves at their other properties—evidence of the fine performance they provide.

Simplify your procurement problems by calling the nearby OIC distributor. The OIC Long Line offers the right valve for every job.

THE OHIO INJECTOR COMPANY
WADSWORTH, OHIO

OIC
FOUNDED 1883

VALVES
FORGED AND CAST STEEL · IRON · BRONZE

For top belt-conveyor efficiency, top paper mill men rely on LINK-BELT

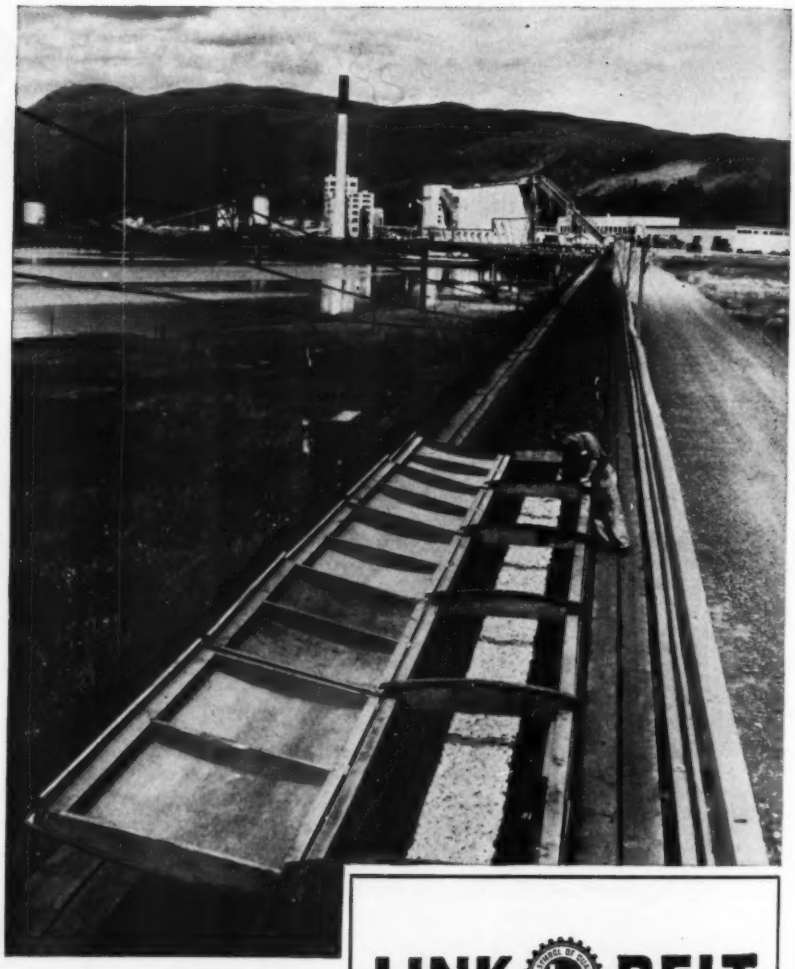
LINK-BELT engineering experience plus quality components combine to cut handling costs

Yes, in paper mills everywhere, Link-Belt is first choice in belt conveyors. Whether your job is large or small, Link-Belt can apply unequalled engineering experience to meet the conditions of your particular system.

Link-Belt builds a complete line of quality components. Our conveyor engineers can choose from all types and sizes of idlers, trippers and terminal machinery to match your exact requirements.

Link-Belt can also supply all related equipment — other types of conveyors, feeders, elevators, car dumpers and shakers. And Link-Belt will build your supporting structures and enclosures . . . install the job completely if desired.

Link-Belt will gladly work with your engineers or consultants. Get in touch with your nearest Link-Belt office.



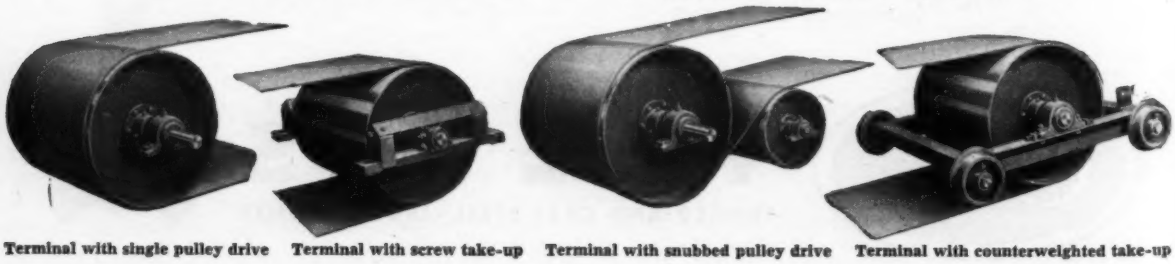
Wood chips are carried from screens in pulp mill wood room to digesters on Link-Belt 24 in. wide belt conveyor system, using side rolls set at 45° for greater capacity.

LINK-BELT

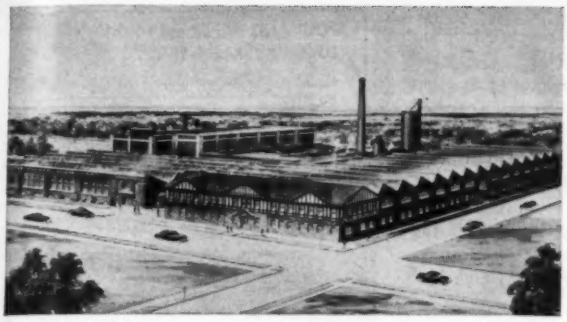
BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,747-B

LINK-BELT Pre-Selected Terminals—the right equipment for every requirement



Terminal with single pulley drive **Terminal with screw take-up** **Terminal with snubbed pulley drive** **Terminal with counterweighted take-up**



NEW PLANT of the Copes-Vulcan Division of Continental Foundry & Machine Co. in Erie, Pa.; the division was formed recently by the consolidation of the Northern Equipment Division and the Vulcan Scot Blower Division and turns out boiler feed water regulators

OPEN HOUSE recently at Yarnall-Waring Co., Philadelphia, attracted more than 850 employees, friends, customers, distributors, and suppliers; tours were conducted through the plant, where the manufacture of steam plant equipment was shown

Mich. The plant is expected to be in operation by the end of 1953, with a total yearly production rate of approximately 100,000 tons.

Sulphur Supply Hinges on Success in Louisiana

Louisiana's marshlands are currently the scene of an experiment that may well determine whether or not the world supply of sulphur is to be adequate to meet the ever-increasing needs of industry. Sometime next month the "amphibious" mining plant being constructed by Freeport Sulphur Co. will be towed from Grand Ecaille to Bay Ste. Elaine in the Mississippi Delta, where it will be anchored in preparation for regular operation. This is one of two marshland projects the firm is developing in a $20,000,000 program to increase the supply of sulphur.

Bay Ste. Elaine and Garden Island Bay, the other Freeport project, are located close to the open waters of the Gulf of Mexico. The maximum elevation is one foot. Grand Ecaille was developed by Freeport 20 years ago. Last year it turned out a record 1,272,000 long tons. It is this record that causes Freeport to gamble on its sea-land mining plant at Bay Ste. Elaine, but it will be many months before the outcome is known.

New Canadian Plant

Shell Oil Co. of Canada has put into operation a new sulphur plant at Jumping Pound, Alta. With an output of 30 daily tons of 99.9 per cent pure sulphur, the installation is producing for the pulp and paper manufacturers of the Pacific Coast. Part of an extensive Shell conservation program, the plant recover sulphur from hydrogen sulphide gas that comes from an adjoining natural gas field.

W. Va. Discontinues Calcium Carbonate Manufacture

The manufacture of precipitated calcium carbonate by the Industrial Chemical Sales Division of West Virginia Pulp & Paper Co. is to be discontinued October 31. According to the firm, the decision to discontinue the product was prompted by a pronounced shift in demand toward technical grades that have become increasingly difficult to produce at competitive price levels because of constantly rising manufacturing costs.

The firm has been making precipitated calcium carbonate since 1912, devoting the bulk of its production to grades conforming to purity and uniformity standards of the Pure Food and Drug Law and the U.S. Pharmacopoeia.

Company officials reported that increased efforts would be directed toward the further development of lignin, another important product of the division. West Virginia's Charleston, S.C., plant alone has raw material for lignin available in quantities sufficient to support production of approximately 400 tons per day.

DELIVERY OF THE 1000th E. P. Lawson Co. 39" automatic clamp cutter was celebrated recently at Milton C. Johnson Co., New York, N. Y., the purchaser; in the picture are (l to r): Walter D. Gemmell, Johnson executive vice president; Charles E. Bieth, Johnson president; David W. Schulkind, president of E. P. Lawson, and Nat B. Goldberg, plant superintendent

Allied Notes

Ross Heater & Mfg. Co. Inc.
and Kewanee Boiler Corp., two divisions of American Radiator & Standard Sanitary Corp., have combined to form a new company, Kewanee-Ross Corp. The move was effective June 30. Kewanee has offices and plants in Kewanee, Ill., and Lebanon, Pa., while Ross maintains its executive offices and works in Buffalo.

Appleton Machine Co.,
Appleton, Wis., has been licensed by Hydraulic Machinery Co. Ltd., Montreal, to sell and manufacture the Hy Mac Cowan decker in the United States. In addition, the firm is authorized to sell and manufacture the Cowan centrifugal pulp screen in all states not bordering on the Atlantic Seaboard. The latter territory will continue to be covered by Montague Machine Co., Turners Falls, Mass.

Allied Chemical & Dye Corp.
has announced that effective June 1 the Solvay Process Division and the Solvay Sales Division were consolidated and are now known as the Solvay Process Division. The division is responsible for the production and sale of alkali, chlorine, and related products.

Dilts Machine Works,
a division of The Black-Clawson Co., Hamilton, Ohio, has announced the opening of its new coating laboratory

for test purposes and pilot runs. Services of the laboratory are to include: checking present coating operations on the Dilts Contracoater; testing new compounds, new formulations, and different web materials, and the production of commercial equivalent coated products as a check for sales acceptance.

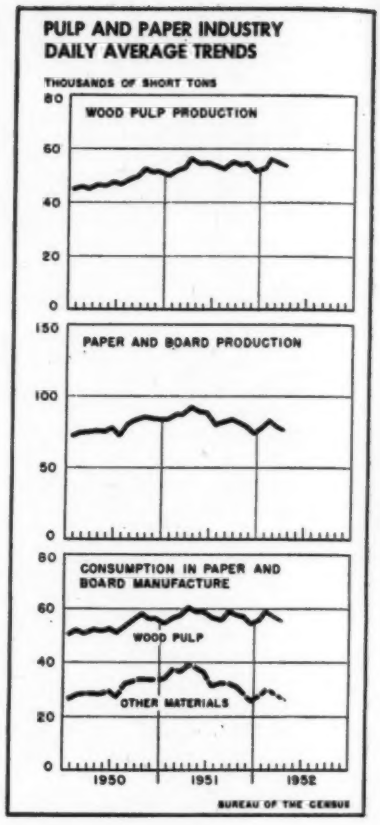
Monsanto Chemical Co.'s
Merrimac Division has established a fellowship in forestry at New York State University, Syracuse. The fellowships were created for one year and carry grants of $1,500. Ralph H. Borroughs Jr. of Pontiac, Mich., has been selected for the fellowship. His research will be concerned with chemical means of modifying paper.

Research Corporation
has been awarded two contracts covering installation of the new wet-bottom type Cottrell electrostatic precipitators for recovery of salt cake and sodium salts in pulp and paper mill applications. Maxon Construction Co. will handle installation at Rome Kraft Co., Rome, Ga., where two precipitators will recover salt cake at a specified collector efficiency of 90 per cent from 140,000 cfm of gases at 275-300F. from a spray type recovery furnace handling 900,000 lb. black liquor solids daily. Ebasco Services will install two precipitators for Rayonier Inc. at Doctortown, Ga. Each will recover sodium sulphate from 100,000 cfm of gases at 300F. at a specified collector efficiency of 90.5 per cent.

E. I. du Pont de Nemours & Co.
was to mark the 150th anniversary of its founding July 18 at the site of the first Du Pont powder mills on Brandywine Creek near Wilmington, Del.

20 Watercolors
by Laura J. Neese of Beloit, Wis., are to be on display in the library of the University of Maine, Orono, until August 15. Mrs. Neese is the wife of E. E. Neese, president of Beloit Iron Works. Most of the artist's watercolors are of outdoor subjects. However, some of them depict activities at the Iron Works. All proceeds of the showing are to go to the Pulp and Paper Foundation of the University of Maine.

The Kaydon Engineering Corp.,
Muskegon, Mich., has purchased A. Harold Frauenthal Inc. The Frauenthal Division of Kaydon will continue the manufacture of multiple-head precision cylindrical grinders and boring and turning machines.



U. S. Paper and Paperboard Production

	Apr. 1952 (tons)	Mar. 1952 (tons)	Apr. 1951 (tons)	Total 1951* (1,000 tons)	Total 1946 (1,000 tons)
Paper and Board, total	2,013,924	2,070,568	2,320,963	26,086	19,278
Paper, total	940,398	993,042	962,903	11,622	8,752
Newsprint	89,654	96,269	88,687	1,106	773
Groundwood paper (uncoated)	74,913	71,558	61,775	789	776
Printing and converting (coated)	93,823	98,765	97,730	1,115	486
Book paper (uncoated)	127,096	130,174	135,323	1,622	1,447
Fine paper (writing, cover and text, bristols, thin paper and other)	116,433	124,033	113,501	1,364	1,160
Coarse paper (unbleached, kraft, glassine, greaseproof, vegetable parchment and other)	277,612	307,066	285,683	3,597	2,690
Special industrial paper	35,689	38,311	35,169	419	272
Sanitary paper	97,863	98,887	105,310	1,215	861
Tissue paper	17,970	17,255	27,497	270	184
Absorbent paper	9,345	10,724	12,228	124	103
Paperboard, total	855,103	870,284	1,076,874	11,605	8,396
Containerboard, total	448,098	460,654	592,513	6,347	4,315
Liners	301,847	313,838	391,112	4,205	
Corrugating material	124,087	125,720	167,810	1,815	
Container chip	22,164	21,096	33,591	328	
Bending board (folding boxboard)	254,981	256,429	318,944	2,429	2,317
Non-bending board (set-up boxboard)	62,009	65,221	79,443	701	521
Cardboard	6,093	5,452	7,466	79	89
All other paperboard	83,922	82,528	78,508	2,049	1,154†
Wet machine board	11,529	10,663	14,552	144	138
Construction paper and board, total	206,894	196,579	266,634	2,716	1,992
Building paper and insulation	110,321	101,932	137,054	1,401	1,036
Hardboard and insulating board	96,573	94,647	129,380	1,315	956

(*) Preliminary report. (†) Includes bending and non-bending board not for use in box plants. *Source: U.S. Department of Commerce.*

April Pulp, Paper and Board Production

Paper and board production during April amounted to 2,013,924 tons, according to a report released by the Bureau of the Census. This is 13 per cent less than the tonnage produced in April a year ago. In terms of production base capacity, the industry operated at 73.5 per cent in April, with the paper and paperboard sections operating at 81.2 and 67.8 per cent, respectively. The comparable ratios for March were: Total, 75.9 per cent; paper, 86.3 per cent, and paperboard, 69.1 per cent.

Pulpwood receipts at the pulp mills during the month were 1,902,573 cords, with consumption at 2,234,807 cords. Month-end inventories decreased 6 per cent to 5,586,284 cords.

Wood pulp production during April amounted to 1,390,316 tons. In terms of production base capacity, pulp production ran at 82.7 per cent, as compared to 87.4 per cent in March.

Wood pulp inventories at the end of April at the paper and board mills increased 2 per cent to 543,310 tons. Month-end stocks at the pulp mills increased from 112,168 tons to 127,293 tons.

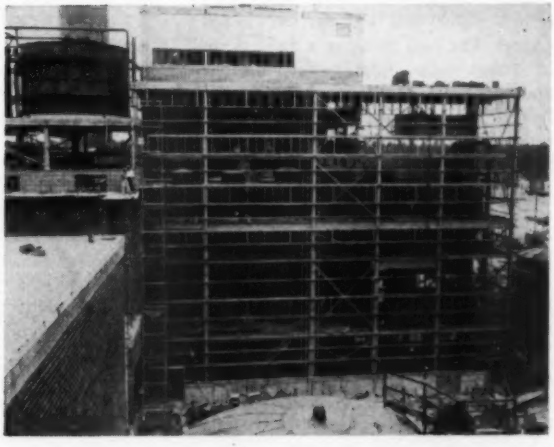
Eichleay Installed 3,400 Tons of Equipment

at the new Pulp Mill of the Riegel Carolina Corporation at Acme, North Carolina

The chore consisted of unloading and erecting a large Pulp Dryer and such other machinery as Pumps, Washers, Chippers, Digesters, Evaporators, Conveyor systems, Lime Kiln, etc.

Eichleay Service is Flexible

Whether the job involves the handling of a single unit, or the entire plant equipment, the construction of foundations, or the moving of structures, Eichleay service is prompt, efficient and economical—and performed with minimum interruption in production schedules.



Eichleay CORPORATION

33 South 19th St., Pittsburgh 3, Pa.
681 Market St., San Francisco 5, Calif.

Air view of new Riegel-Carolina mill on the Cape Fear River

Riegel now in pulp production

A. W. J. DYCK, Ph.D.

Consulting Editor

DURING DECEMBER 1951 Riegel Carolina Corp., a wholly owned subsidiary of Riegel Paper Corp., commenced production of sulphate pulp at its new mill located on the Cape Fear River near Acme, N.C. Riegel, because of the partial integration of its pulp supply, is no longer as vulnerable to pulp shortages that reoccur under conditions of national emergency and has better control over the type and quality of the pulps that go into its specialty papers. The new mill has a daily output of 200 tons of high quality bleached and unbleached sulphate pulp, which largely meets the requirements for this type pulp at the company's four New Jersey paper mills. These mills, located at Milford, Warren Glen, Hughesville and Riegelsville, N.J., have a combined daily production of 300 tons of specialty papers.

The management of Riegel Paper Corp. has recognized for some time the need for operating its own pulp mill. The Second World War and construction material shortages, however, were responsible for delaying building operations. J. E. Sirrine & Co. were the engineers for the job and C. M. Guest & Sons were the contractors.

Installation of machinery and equipment at Riegel Carolina was under the supervision of Eichleay Corp., Pittsburgh. The work consisted of unloading and erecting 3,400 tons of machinery, including a large pulp dryer, pumps, chippers, digesters, lime kiln, washers, evaporators, and numerous conveyor systems. The project was accomplished with a minimum of interruption to normal plant operations.

Ideal location

The mill is ideally located near Waccamaw Forest where the Company has acquired an area of 150,000 acres. This land is estimated to yield an annual growth of about 75,000 cords of pulpwood, while the forest area within a 30-mile radius of the mill has an estimated annual new growth of 280,000 cords that can be supplied by independent owners. Riegel Carolina mill's annual requirement of pulpwood is about 150,000 cords, 80 per cent of which is pine—such as slash, loblolly, pond and longleaf, and 20 per cent hardwood consisting of various types of gums. The company has opened three woodyards within a 100-mile radius of the mill for the collection of pulpwood in the more distant areas.

The mill has six digesters and a six-stage bleach system, the final stage using ClO_2 as a bleaching agent. The mill is designed for maximum flexibility and diversification of products. Facilities have been incorporated for simultaneous and separate production of two kinds of unbleached pulp from the same or different types of wood, for the manufacture of pulps of various moisture contents, and for the production of semi-chemical pulp.

A black liquor recovery unit and a bark burner supply 75 per cent of the mill's steam requirements, while an additional boiler equipped to burn oil or coal provides the remaining 25 per cent steam.

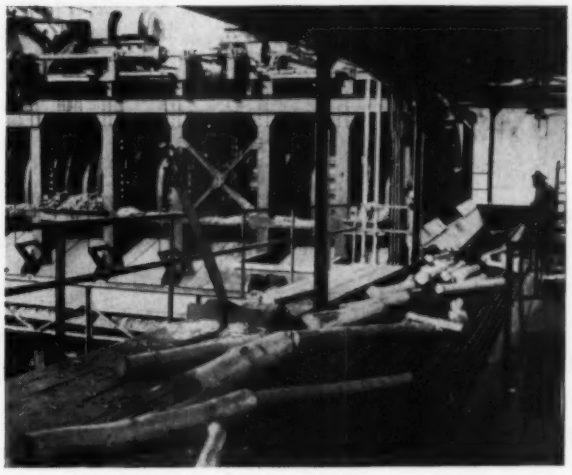
The operation of this new mill is under the leadership of Dr. C. E. Hartford, Riegel Carolina Corp. vice president. Other operating personnel includes: R. C. Passmore, assistant secretary; J. D. Dailey, production manager; Charles E. Roth, pulp mill superintendent, J. D. Rhodes, maintenance supervisor; Robert H. Aranow, personnel director; Walter C. Ashworth, assistant personnel director; A. L. Wiley, technical director; H. R. Arnold, plant engineer; C. Cline Peters, assistant plant engineer; J. R. Wright, area chemical engineer; Vernon B. Bodenheimer, area chemical engineer; E. Webster Bartholow, area chemical engineer; R. H. Reynolds, plant electrician; A. R. McBeth, wood department superintendent; Robert Pearson, instrument supervisor; and R. O. Halverson, purchasing department.

Chip preparation

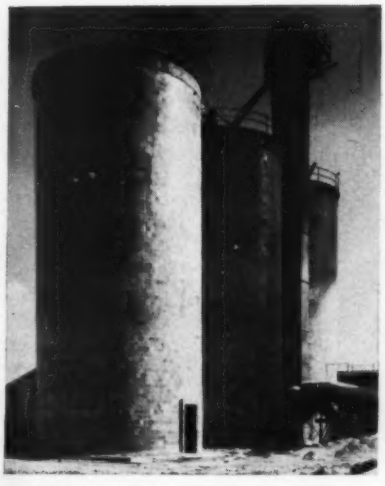
Logs, carried by a Link-Belt Co. conveying system to the top of the log haul, are fed into two chain-suspended Fibre-Making Processes Inc. barking drums. They are 12 feet in diameter and 45 feet long, one being a wet-bottom and the other a dry-bottom barker. The barking drums are driven by two General Electric motors.

The debarked logs pass over a sorting table to a D. J. Murray Mfg. Co. single ten-knife Murco Chipper, 88 inches in diameter. Two Orville Simpson Co. vibrating screens separate the over-size chips and re-route them to a small Car-

Conveying system by Link-Belt
and barkers by Fibre Making Processes

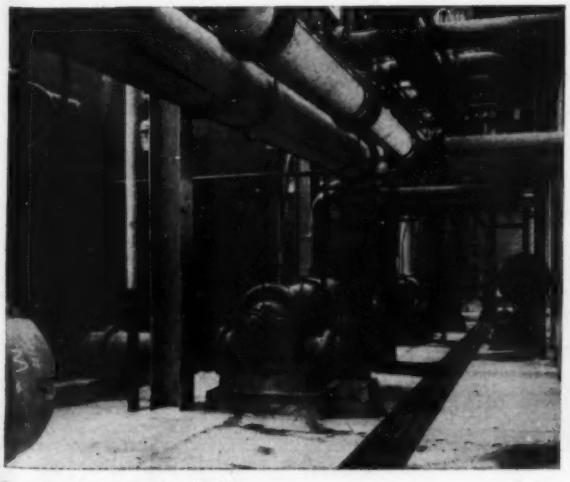


Details of chain-suspended barker
and General Electric motors



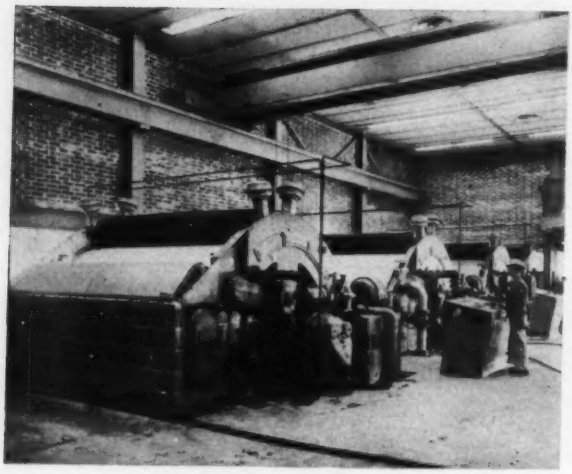
59-foot Stebbins silos, one of
which is reserved for gum chips

Digester operating floor,
showing Link-Belt tripper in background

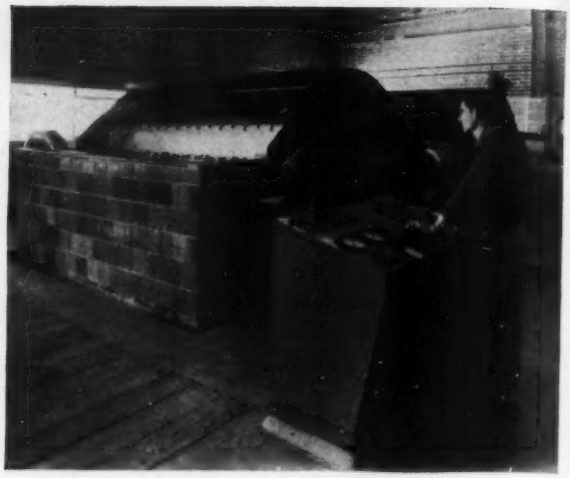


Pump gallery in washer building

Impco flat screens and control panel

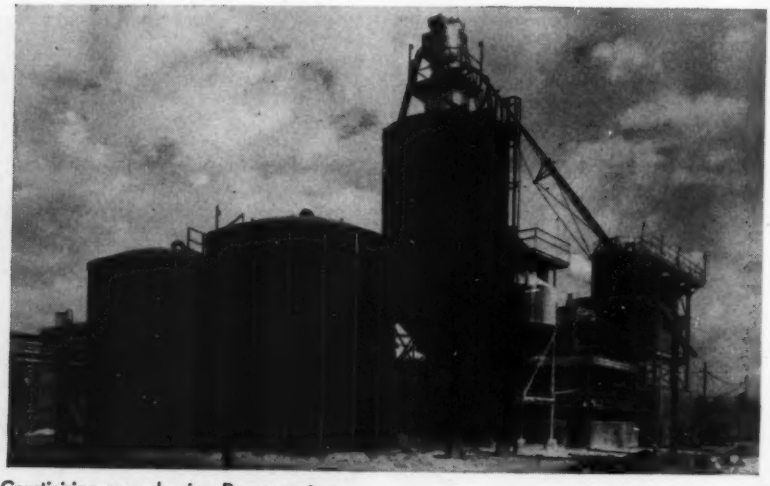


Six-stage bleach system by Impco



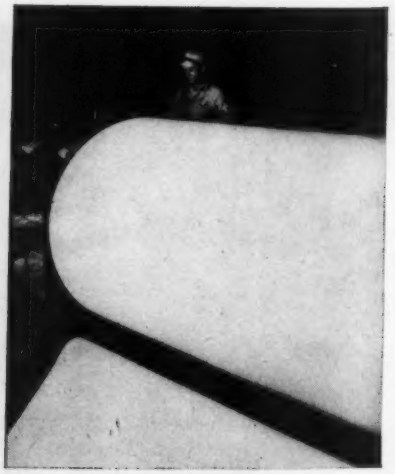
Rotary vacuum washer by Impco and central console

Vacuum cylinder roll



Causticizing area showing Dorrco system

Forming machine by Impco



Bleached pulp on pre-dryer of Impco forming machine

thage Machine Co. rechipper. Accepted chips are conveyed to three 26,000-cubic foot Stebbins Engineering silos, one of which is reserved for gum chips. The silos are 59 feet in height.

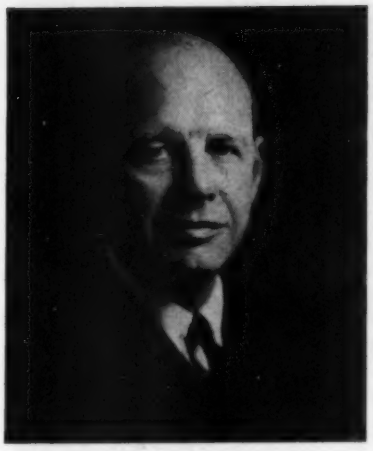
From the silos the chips are fed to a 416-foot belt conveyor which passes over a Merrick Scale Mfg. Co. automatic Weightometer before ascending to the top of the digesters. Here a Link-Belt tripper dumps the chips into any of the six digesters.

Digesters

The five 3,200-cubic foot capacity Graver digesters are clad with 1/8-inch stainless steel. The sixth digester is a Chicago Bridge & Iron Co. carbon steel vessel. They are 43 feet high and 11 feet in diameter, with 23/32-inch-thick top and 1-1/16-inch-thick bottom conical sections. Fully equipped with control instruments by The Foxboro Co. and with Yarway hydraulically operated blow valves by Yarnall-Waring Co., the digesters operate at 100 psi pressure and 338F.

Digested pulp is blown into a Steel Construction Co. blow tank, from where it is pumped to an Improved Paper Machinery Co. vibrating de-knotter. Accepted stock from the de-knotter is washed in a four-stage counter-current Impco washing and vacuum-filtering system.

Washed kraft is then diverted to five primary and two secondary Impco flat screens, while the washed gum stock is screened on four primary and two secondary flat screens. Following the screening operation the consistency is increased in two valveless Impco deckers.



John L. Riegel
Chairman, Riegel Paper Corp.
President, Riegel-Carolina

Sulphur dioxide

Molten sulphur is fed by a Chas. S. Lewis & Co. pump from the pit to an Acme Cooper Smithing Co. sulphur-burner, where it is oxidized to sulphur dioxide. Sulphur dioxide is passed to a Peabody Engineering Corp. absorption tower, where it reacts with water to form sulphurous acid. The lower part of the Peabody tower is brick-lined, while the upper part is clad with 0.3-inch stainless steel.

Any sulphur dioxide not absorbed in the Peabody tower enters at the bottom of a small ceramic U.S. Stoneware stripping tower packed with 1-inch Raschig rings. Sulphur dioxide is completely absorbed in the soda ash spray of the stripping tower.

While the bulk of the sulphurous acid is piped to the bleach plant, a sizeable quantity is fed into a 19-foot brick-lined steel tower, where it reacts with soda ash to be converted to sodium sulphite used in the cooking of semichemical pulp.

Turpentine

Turpentine is recovered in a unit manufactured by Foster Wheeler Corp. Relief gases from the chip digesters first enter a cyclone, where they are freed from a high-boiling condensate which is re-routed to the black liquor system. The vapors—consisting of turpentine and water—leave the cyclone and are then passed through a condenser. The condensed immiscible liquids enter a tank where they separate. A pipe extending almost to the bottom inside the tank and opening at the side provides a constant-level overflow for the water, while turpentine is continuously being decanted through an opening at the top of the tank. Daily production of turpentine amounts to 500 gallons.

Water plant

An operation that cannot be overlooked is that of the water filtering and conditioning plant. Three Layne & Bowler pumps feed water from the Cape Fear River at the rate of 5,750 gallons per minute each. This provides the Riegel Carolina plant with the daily requirements of 13,000,000 gallons.

An American Well Works homomix intimately mixes the water with alum and alkali, which are automatically measured into the water line by Omega Machine Co. universal feeders, while hypochlorite is metered into the system by two Milton Roy Co. pumps. The

Walker Hamilton
Exec. Vice Pres.

Aaron P. Mitchell
Vice Pres. Sales

Ward Harrison
Vice Pres. Production

Curt A. Young
Mgr. of Engineering

J. D. Dailey
Production Manager

C. E. Roth
Pulp mill supt.

James D. Rhodes
Maintenance Supt.

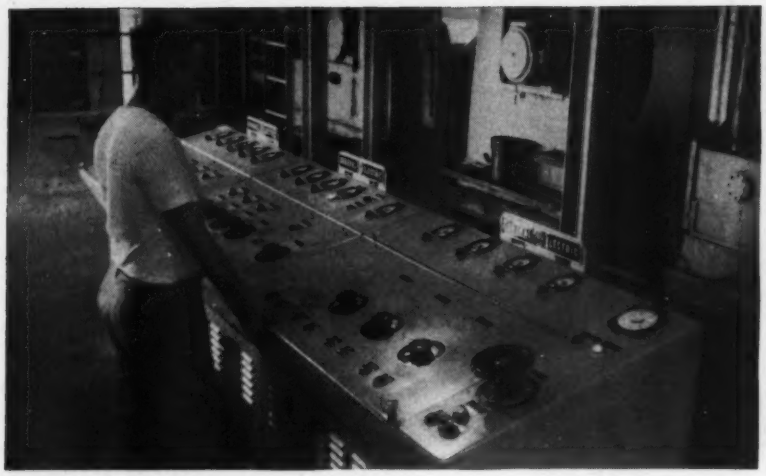
A. L. Wiley
Process control sup.

H. R. Arnold
Plant engineer

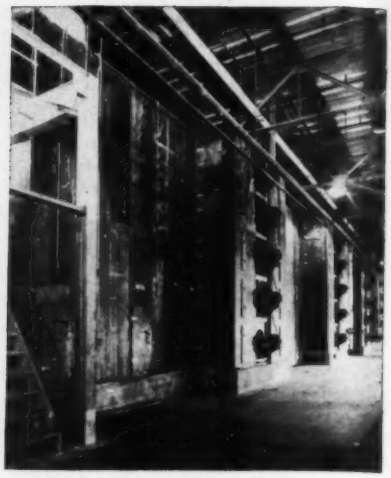
James R. Wright
Area chemical eng.

V. B. Bodenheimer
Area chemical eng.

E. Webster Bartholow
Area chemical eng.

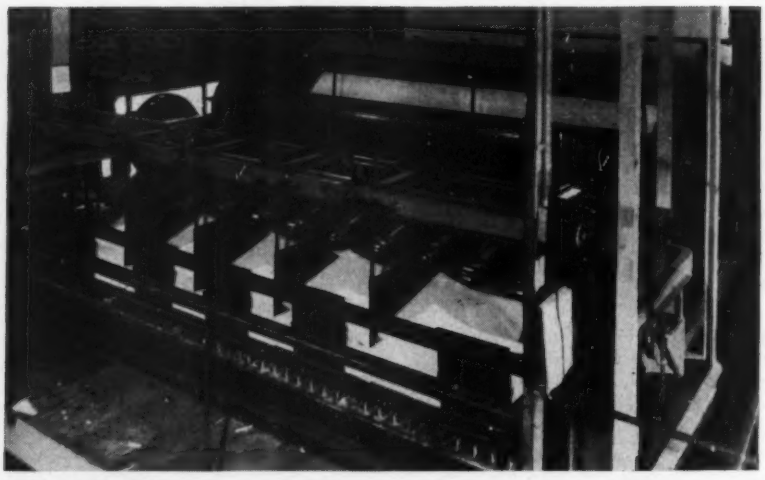


Control console governing
Impco wet machine and pulp dryer



Ross dryer and vertical
Sturtevant Axiflow fans

Pulp sheet passing through
Moore & White slitter and cutter



Stacking pulp sheets
on Mathews conveyor layboy

treated water is then passed into Dorrco flocculators and filtered through Roberts Filter Mfg. Co. filters.

It is then stored in a 1,700,000-gallon reservoir, which is connected with the clear-well with a capacity of 800,000 gallons.

Recovery of chemicals

Black liquor from the washers is stored in three 110,000-gallon storage tanks. From here it is fed into the Goslin-Birmingham Mfg. Co. six-effect evaporator system. In the course of this process black liquor is concentrated from 14 per cent to 50 per cent solids. The concentrated black liquor is stored in the 50,000-gallon concentrated liquor storage tank.

The liquor then goes to a D. J. Murray Cascade to be further concentrated to about 65 percent solids. The black liquor is now sufficiently concentrated to be sprayed into the Combustion Engineering recovery furnace. The smelt from the recovery furnace is dissolved in the dissolving tank, mixed with salt cake in the salt cake mixing tank, and then pumped to the 88,000-gallon green liquor storage tank in the causticizing area. A Research Corporation Cottrell precipitator, picks up chemicals recovered from the furnace gases.

Causticizing

Green liquor is pumped through a Foxboro recording controller to a Dorrco green liquor clarifier, where the dregs are allowed to settle out. The dregs are pumped out by Dorrco units washed in a counter-current operation, and discharged to the sewer. The clear solution from the clarifier is used to dissolve the smelt from the recovery furnace.

From the green liquor clarifier the clear solution flows into a Dorr slaker-classifier, where lime is added, and the process of causticizing and clarifying is then continued according to the well-established Dorrco system, i.e., the green liquor overflows to a head tank, then to three 7,000-gallon causticizers connected in series, and to a white liquor clarifier from which it overflows to a white liquor storage tank.

The lime mud from the causticizing operation, after thorough washing in Dorr washers, during which operation appreciable quantities of chemicals are recovered, is pumped to a ferris-wheel feeder, which accurately controls the supply of the 30 per cent mud slurry to the Bird Machine Co. centrifuge, which concentrates it to 60 per cent solids.

From here the mud is conveyed by screw conveyor to an 8 by 250-foot Traylor Engineering & Mfg. Co. kiln fired by a Coen Co. heating unit. The

mud leaves the kiln in the form of 93 per cent CaO.

Pulp machine and Ross dryer

The Impco 156-inch forming machine has an 8-foot diameter cylinder mold, a 3-foot diameter first press, a 5-foot 10-inch diameter pre-dryer, and a 3-foot diameter second press. Its speed variable between 40 and 110 feet per minute, the machine feeds a sheet of 50 per cent moisture content to a steam-heated J. O. Ross Engineering Corp. dryer.

A smaller size Kamyr machine produces wet lap.

The Ross dryer is designed to dry 200 tons pulp per day. It is 156 inches wide, operates at 275F., and contains nine horizontal conveyors—each 146 feet long. Forty Sturtevant Axiflo fans by Westinghouse are arranged in four vertical groups of five fans per group on both sides of the Ross dryer. A heat recovery unit on top of the dryer condenses moisture and supplies the dryer with pre-heated fresh air.

Leaving the dryer, the pulp sheet passes through a Moore & White Co. slitter and cutter. The cut squares are stacked in approximately 500-pound stacks on a Mathews Conveyor Co. layboy. From here the stacks are conveyed to a Toledo scale, adjusted to 500-pound weights, and then baled on a Baldwin hydraulic press.

Among the products of the Riegel Carolina mill are Albacel Bleached Sulphate having a G.E. brightness in excess of 80 and Super Albacel having a G.E. brightness in excess of 86. Because of their strength, brightness and unusual cleanliness, these two pulps are outstanding among the bleached sulphate pulps produced in the world today.

Factors involved in wood pulp production—Part I

First part of a thorough discussion by Dr. Maass of some of the underlying factors involved in the process for woodpulp production, in which the author reviews work carried out under his direction at the Institute. The conclusion—to appear in August—will deal with sulphite cooking, burning of chips, reactions with lignin, rate of delignification, lignin undergoes physical change, periodate lignin, alkaline cooking, continuous pulping procedures.

DR. OTTO MAASS*
General Director
Pulp and Paper Research Institute of Canada

THE CHEMICAL PULPING of wood has for its purpose the production of a material which is suitable for the manufacture of paper. In principle, it consists of the separation of cellulose fibres from the other wood constituents, of which lignin is the most abundant. This separation is dependent on chemically changing the lignin and the other non-cellulose constituents so that they can be dissolved out or, at least, that the lignin be made to loosen its encrusting embrace of the cellulose fibres. The liquor containing the chemicals which are able to do this has to be allowed to reach the lignin in the wood. Even though wood is a porous solid, liquor penetration followed by solute diffusion can easily be seen to be one of the prime factors involved which requires careful study.

The composition of a pulping liquor varies greatly. It may be acid, neutral, or alkaline in character; and the physico-chemical equilibria existing in each system and the influence of temperature, pressure, and concentration on such equilibria are factors which have to be taken into account.

Such side issues as the sorption of the reagents and their relative distribution on the various wood constituents have to be examined. Attempts can then be made to speculate as to the mechanism of the reactions between the chemicals and the wood as a guide in deducing optimum conditions of pulp production.

There are two principal methods of wood pulp production: mechanical pulping and chemical pulping (commonly called chemical cooking of wood).

Chemical pulping involves two principal processes, acid pulping and alkaline pulping.

The principal chemical constituents of wood are cellulose, lignin, and wood polyoses, the last commonly called hemicelluloses. The cellulose is present to approximately 42 per cent and lignin 29 per cent in softwoods. It is to a large extent because of its structure as it occurs in nature that wood is found to be particularly suitable for the production of paper. The essential feature of wood morphology is that the cellulose, as formed in nature, is in the shape of easily fibrillated fibres, which are incrusted in the lignin. When these fibres are separated and uniformly suspended in water at a consistency of about ½ of 1 per cent, they can be filtered out on a sieve and a sheet formed. This sheet, after drying and pressing, is paper which can be made to have the necessary tensile, burst, and tear strength required for the use to which it is to be put. The mechanism which gives this paper strength, while not completely understood, is explained as being due to the bonding between the cellulose surfaces of the fibres, the bonding coming into play when the water is removed. The other wood constituents do not have a fibre structure, nor do they exhibit the bonding feature of the cellulose fibres. Hence, the separation of the cellulose fibres by chemical pulping gives an ideal product for paper production. However, this includes an economic loss of wood material which is becoming more acute every day: the cost per cord of wood has increased from $15 to $25 in the last 20 years, and if the cellulose alone is extracted, over half by weight of this wood goes down the drain and up the chimney.

Mechanical pulping of wood consists in defibering the wood by means of a grindstone in such a way that the fibre structure is not destroyed. Incrusted with

*Paper presented by Dr. Maass upon receipt of the 1952 Chemical Institute of Canada palladium medal donated by International Nickel Co.

The following investigators collaborated with Dr. Maass in the work outlined in the address: W. B. Beazley, J. M. Calhoun, W. B. Campbell, J. J. R. Cannon, A. J. Corey, R. de Montigny, E. Filby, P. E. Gishler, N. H. Grace, A. D. Grieve, G. W. Gurd, H. W. Johnston, G. L. Larocque, Carol E. Maass, L. S. Macklin, O. M. Morgan, L. M. Pidgeon, R. Richardson, H. H. Saunderson, J. H. Sutherland, and F. H. Yorston.

lignin and somewhat broken up, these fibres will not produce a paper having anything like the required mechanical strength. When, however, 15 per cent of chemical pulp, produced by the sulphite process, is uniformly mixed with mechanical pulp, a paper can be produced which meets the necessary requirements for newsprint and results in 90 per cent by weight of the wood being utilized.

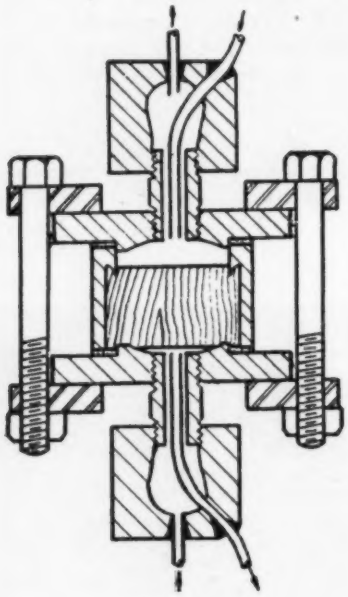


Figure 1

These are the two extremes of utilizing the original wood. However, the industry has, with some success, found an intermediate procedure called semichemical pulping, which involves a modified chemical treatment followed by defibration in what is known as a refiner. This approaches the goal of utilizing the maximum amount of wood material to give a pulp which will answer the specifications for a number of paper requirements.

Penetration—natural and forced

Penetration is the most important factor in efficient cooking. Both natural and forced penetration have been intensively studied in laboratories of the Pulp and Paper Research Institute of Canada. Penetration may be defined as the entrance of any gas, liquid, or solid into the body of the wood. By natural penetration is meant the entrance of a reagent into a portion of porous solid already filled with solvent and surrounded on all sides by the solution of the reagent. This is governed by osmotic pressure differential and is more commonly known by the name diffusion.

Forced penetration has a characteristic which distinguishes it from natural penetration, that is, the mass motion of liquid, gas, or solution caused by hydrostatic pressure differential. Apart from the nature of the fluid and the species of wood used, the variables influencing the rate of penetration are many. The rate depends on pressure differential, thickness penetrated, and temperature, and on whether heartwood or sapwood is used. The structural direction in the wood, the condition of the wood all play a part. To study all their effects under proper control, a technique was devised to measure the rate of flow of a liquid while varying one condition at a time and keeping the others constant.

Penetration of liquids

A slab of wood, cut to the proper dimensions, was clamped in position as shown in Fig. 1. The liquid could be forced to flow through under a large range of driving pressure, with back pressure varied at will. The direction of the pressure differential could be reversed. The liquid over the surface of the wood could be changed during an experimental run. The amount of liquid passing per unit time could be accurately measured and the temperature controlled by a thermostat. Experimental details to accomplish all these desired conditions would take too long to describe.

There are three structural directions in wood and, according to these, transverse, tangential, and radial penetration have to be examined. A diagrammatic sketch is shown in Fig. 2 to explain how wood slabs are cut from a log for this purpose. A disc of the size represented by *D*, in plan and elevation, when cut from the log as shown at *A*, serves to measure transverse penetration, that is, flow in the same direction as the stem of the tree. Flow at right angles to this direction may be measured as tangential if the disc is cut as at *B* and radial if as at *C* as indicated. When taken from a segment of a log from a tree of sufficient maturity, these slabs can be chosen to be either all sapwood or all heartwood.

Wood fibres run parallel to the tree stem and in conifers (softwoods) are tubular in shape (hollow inside) and are called tracheids. They convey the sap in the living tree and are laterally connected with one apother by numerous so-called bordered pits containing diaphragms perforated to permit mass flow of liquid. The dimensions of these tracheids vary with wood species. In spruce an average figure is 3 mm. long and .05 mm. diameter. The bordered pits are extremely minute in diameter and the perforations in the membrane submicroscopic.

Measurements showed that, as expected, the rate of penetration was characteristic of the species and the condition of the wood. On the average, transverse penetration rate is one hundred times that of tangential and radial penetration, the latter two being of the same order of magnitude. Rather unexpectedly, it was found that the rate of flow increases more rapidly than in direct proportion to the pressure differential and more slowly than in proportion to the slab thickness. Rise in temperature increases the rate more rapidly than could be deduced from the decrease of viscosity with rise in temperature of the penetrating liquid.

By devising accurate means of measuring penetration rates in a reproducible manner, a great deal of data have been

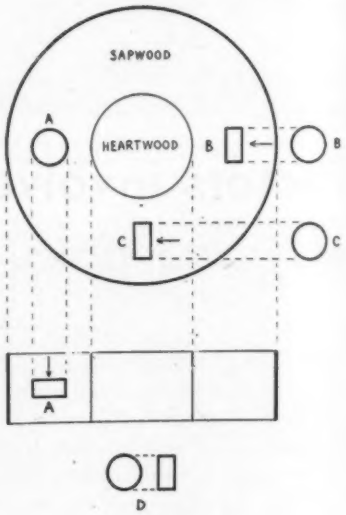


Figure 2

accumulated from which deductions of interest to plant biologists can be made. For instance, it can be concluded that the theory of a closing valve action taking place in the bordered pits is questionable. It was certainly proven that by far the major flow of liquid takes place through tracheids in the conifers.

Penetration of gases

Penetration studies of gases, using the same technique, have been made, and results of particular interest to the chemical cooking problem were found when two-phase gas-liquid penetration was studied. Only transverse penetration, that is, along the fibre direction, has been examined in this connection.

Nitrogen gas was used and found to pass freely through dry wood, the rate depending on the pressure. Wood absorbs water, some 10 per cent being absorbed at 50 per cent relative humidity; and, while the rate is affected, there is still free passage of gas until the second phase, liquid-water, is present in the wood which then, for purpose of convenience, may be designated as wet-wood. This offers strong resistance to gas penetration. This is due to the discontinuity resulting from the simultaneous presence in the wood of two

phases. Pressures of 100 lb. have been applied to wetwood with no penetration taking place through a slab 3 cm. thick.

A striking way in which this resistance was demonstrated was by forcing a solution of carbon dioxide through a slab at a given pressure differential, the over-all pressure on both sides being such that the gas remained in solution. Then, when the over-all pressure was lowered so that calculations showed carbon dioxide would be liberated at some intermediate pressure in the wood but not on the high pressure side, penetration ceased, although the pressure differential was maintained constantly.

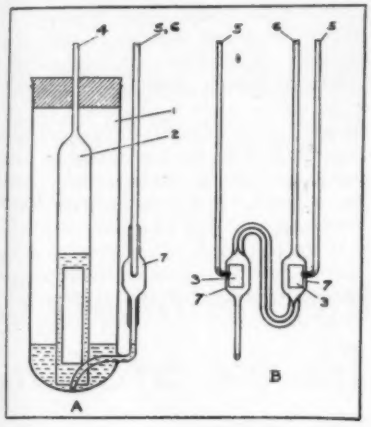


Figure 3

Considerable evidence was established that this phenomenon was not due to valve action in the bordered pits. It may be attributed to a "Jamin's tube system" being established in the tracheids. For those who are not familiar with the term, Jamin found that, due to deformation of air bubbles in mercury placed in a capillary, surface tension forces come into play so that the mercury will not move until a critical differential pressure is applied, depending on the number of bubbles and the diameter of the capillary.

Natural penetration studies

In order to study natural penetration, it was realized that the structural directions of the wood played an important role, and therefore the following experimental procedure was evolved. Chips of wood, all equal in weight (2.75 grams oven dry) and square in cross-section, were prepared but having different lengths in the fibre direction over a range of from 0.5 to 20 centimeters. These were completely impregnated with water, surrounded with solution, and the rate of penetration measured in the following manner as illustrated in Fig. 3. *A* shows a side view of the diffusion cell containing a chip surrounded by solution. *B* is a section of the conductivity cell by means of which the resistance of the solution was measured. The inner tube (2) was used with chips of length greater than 2.5 cm. The chief purpose of this inner tube was to minimize the amount of solution necessary to cover the chip completely, so that the concentration change would be as large as possible, with a corresponding accuracy in measurement. The solution was drawn up into the inner tube and the level maintained by a clamp on a rubber tube attached to the inner tube (at 4). When making a measurement, this clamp was released, allowing the solution to run down into the main body of the cell where it was thoroughly stirred by alternately sucking up and blowing solution out of the electrode chambers and the inner tube.

When a chip, impregnated with water, is placed in a solution of an electrolyte, the concentration changes as electrolyte diffuses into the chip. This change in concentration provides a means of measuring the rate of diffusion. Knowing the original concentration, the weight of solution, and the weight of water in the chip, the final concentration can be calculated. The concentration corresponding to the diffusion of one-half of the electrolyte finally diffusing into the chip can then be calculated, which makes it unnecessary to continue an experiment much after the half-value has been reached.

It was proved conclusively that the time to half-value of the final concentration attained was independent of the initial concentration of the solution, within wide limits, and observations could be reproduced with accuracy. The results obtained with sodium hydroxide, sodium chloride and hydrochloric acid, at a temperature of 50C., are shown in Fig. 4.

Diffusion is taking place both along the fibre direction and at right angles. Consider each separately. Starting with short lengths, diffusion is practically instantaneous while the chip is of less than two fibre lengths in the fibre direction (0.5 cm.). Time for diffusion to half-value becomes continuously greater as the chip is lengthened, but diffusion at right angles comes more and more into play as chip lengths increase and, eventually, becomes equally great in its influence, after which it predominates and the half-value time begins to decrease. In the curve on the left, fibre direction diffusion predominates. In the curve on the right, diffusion at right angles to fibre direction predominates. These curves meet sharply where the two are equal and give the length of chip having the shape taking the longest time to bring about penetration.

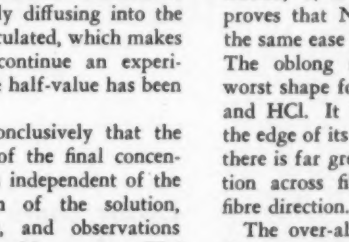


Figure 4

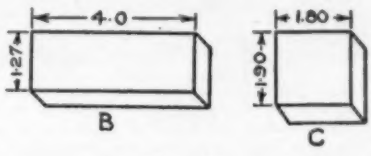


Figure 5

The shapes of these chips are shown in Fig. 5. That representing NaOH penetration, *C*, is practically a cube. This proves that NaOH can penetrate with the same ease in all structural directions. The oblong shape, *B*, represents the worst shape for diffusion for both NaCl and HCl. It is three times as long as the edge of its cross-section, proving that there is far greater resistance to penetration across fibre direction than along fibre direction.

The over-all relative diffusion of the three electrolytes can be obtained by integrating these curves, and the results obtained at three temperatures are given in Fig. 6. The mobilities of NaOH and NaCl are about equal. That of HCl is about double of either. If natural penetration were solely a question of diffusion through the tracheids, HCl should penetrate twice as fast as NaCl and NaOH. HCl does penetrate twice as fast as NaCl, but NaOH penetrates twice as fast as HCl and four times as fast as NaCl.

This is conclusive proof that sodium hydroxide is able to pass through the cell walls, whereas neutral and acid solutions must depend largely on longitudinal diffusion through the tracheids and a limited right-angle diffusion through bordered pit openings and a small amount through the cell walls.

By coating chips with wax along certain structural directions, by using solutions containing mixed electrolytes and examining in particular those liquors used in wood cooking, a considerable amount of data on natural penetration have been accumulated, some of which will be referred to later where it is pertinent to do so. What has been said will help to explain what is involved and

the experimental approach by means of which such fundamental data can be obtained. The conclusions for both forced and natural penetration outlined are based on literally hundreds of experiments carried out by research students working in collaboration with me (Dr. Maass).

Chip size

During cooking, reagents are consumed in the wood and have to be replenished. Even assuming that, at the start, uniform impregnation existed, the solution inside the wood has to be replenished by diffusion, and a counter

Temp.	NaOH	HCl	NaCl
20	1600	900	400
50	3200	1300	600
75	4100	2800	1100

Figure 6

diffusion out of the wood of products formed has to take place. To expedite this, the wood has to be cut into chips. For practical purposes, there is a limit to their size in the fibre direction, because the strength of paper formed depends on having whole fibres, and the longer the fibres, the stronger is the paper formed. Hence, cut fibres greatly reduce the paper strength, and chemical pulp made from sawdust, therefore, has no strength at all. In practice, chips are on the average 2 cm. long in the fibre direction, corresponding to some six fibre lengths. Keeping in mind this governing condition of maintaining the maximum number of whole fibres, conclusions have been drawn from penetration data as to the best chip shape. An obvious inference is that, to get the same penetration rate, chip thickness should be considerably less in an acid than in an alkaline cook.

Lignin—nature and distribution

Before proceeding to the actual chemistry of cooking (that is, the delignification of wood) it is best to describe what, at least, is one school of thought concerning the nature and distribution of lignin in wood. The walls of wood fibres are chiefly composed of the condensed carbohydrate cellulose. The fibres are cemented together by a structure known as the middle lamella, which is largely composed of lignin. However, some lignin occurs in the fibre walls and some cellulose in the middle lamella. Wood and the lignin in it are commonly regarded as porous solids. At first sight, the delignification of wood may be regarded as a heterogeneous reaction since, however finely divided, only a small fraction of the surface molecules would appear to be immediately accessible to chemical reagents. However, there will shortly be presented the experimental results showing that the lignin in wood does appear to be completely accessible to the reagents of cooking liquors when cooking experiments are carried out under certain conditions. Phenol and other organic compounds, which do not affect carbohydrates, swell wood, and it has been shown that this is due to the lignin in wood which can adsorb as much as its own weight of the swelling agent. This action is found to be reversible. In any case, lignin may well be assumed to have the open structure of a swelling gel, and the available surface of lignin must be enormous.

Experimental technique

The discussion of the experimental technique is limited to an account of the flexibility which was devised for keeping control of temperature and concentration. Temperatures up to 140C. were thermostatically controlled to within 1C. To ensure the attainment of the initial temperature, both the wood in the experimental digester and the liquor from outside were pre-heated to the cooking temperature before being brought together. To bring the cook to an abrupt end, the experimental digester was quenched by immersing it in a pail of ice-water. Concentration of cooking liquors were made up to have the exact composition desired. During the cook, concentrations could be maintained practically constant by using liquor-to-wood ratios of 50 to 1. If desired, fresh cooking liquor could be continuously sent into the experimental digester and products of the reaction removed. To ensure penetration, the wood was pre-evacuated to remove air. Some experiments were even undertaken with forced liquor penetration occurring during the actual cooking. For this purpose, the penetration clamp already described was slightly modified. Each of the above procedures was not always followed in a cook. Wherever a special case was deemed to be of sufficient interest to warrant it, the more particular refinements of the procedure were drawn upon. Some cooks were carried out in bronze digesters where, after pre-evacuation, cooking liquor was sealed in, the correction for the initial starting time being calculated. For the purpose of investigating cooking rates, fine sawdust was used at times. Doubtless penetration is then an optimum, and results obtained can be used as a yardstick for comparison with cooks where chips are used.

Labor costs cut by new handling system

With the installation of a new system for handling paper rolls at its mill, Combined Locks Paper Co. of Combined Locks, Wis., has reduced time consumed in the operation by 20 per cent and has cut labor costs by 50 per cent.

By attaching a roll clamp to the fork truck used in its shipping room, the mill has speeded the movement of rolls from finishing room to shipping dock. At the same time, the labor force needed for this job has been cut in half.

An especially built elevator transports the rolls from finishing on the second floor to the first-floor shipping area. As they come from the elevator, fork truck operators use the clamp to pick them up, taking them either to storage or straight to rail cars for shipment. An average of eight boxcars are loaded per day. During busy periods, the daily shipment average almost doubles.

When Combined Locks first started using a fork truck for storage and shipping work, a vehicle outfitted with a scoop attachment was purchased. Though this scoop did the work, company handling men quickly realized their system could be improved. For one thing, two men were needed to get small diameter rolls in and out of the scoop—the operator and a helper who pushed the rolls into position. Another disadvantage: vertical stacking of the rolls was so difficult it wasn't attempted.

Thus, mill officials determined to experiment. After looking over the various ways to handle paper rolls, the finishing room foreman recommended purchase of a specially designed hydraulic clamp mounted on a revolving head. This clamp and head revolve 200 degrees, handle rolls up to 3600 pounds from 31 to 44 inches in diameter. Pressure on the rolls is controlled by a valve on the clamping mechanism.

Using the clamp attachment, the operator approaches the roll with the clamp horizontal. The roll is clamped horizontally and moved to storage or rail car. At the unloading point, the operator rotates the clamp so that the roll is perpendicular for stacking or carloading.

Correction

In "Papermaking economics: the new and the old," which appeared in the June issue of THE PAPER INDUSTRY, the author, Gordon B. Shattuck, was listed as vice president in charge of production for Strathmore Paper Co. His position is manager of supply.

BRINGING THE 33rd ANNUAL MEETING to a close, Glen Sutton, retiring president, addresses banquet at the Sheraton-Cadillac Hotel. Those seated at the head table are (l to r): John Cornell, *Paper Mill News;* W. K. Metcalfe, Raymond Barton, Mrs. Barton, W. H. Brydges, Mrs. Brydges, F. C. Boyce, Mrs. Glen Sutton, President Sutton, Gordon K. Singletary, 1952-53 president; Donald R. Dick, first vice president; H. E. Hadley, second vice president; Howard Street, third vice president; A. E. Bachmann, fifth vice president, and Harry E. Weston, secretary and treasurer

Superintendents meet at Detroit in 33rd annual convention

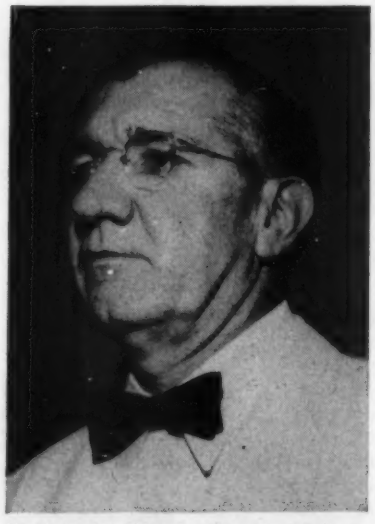
KEYNOTED BY A THOROUGH examination of a year's progress, the 33rd annual convention of the American Pulp and Paper Mill Superintendents Association attracted more than 500 delegates to the Sheraton-Cadillac Hotel, Detroit, June 17-19. With all sections of this country and Canada represented, the conclave was one of the most successful in the long history of the organization.

Theme of the three-day program was an emphasis on both men and machines, with particular stress on trade conditions in the industry. Three forums brought together outstanding spokesmen for all phases of manufacture and representatives of allied industries, who discussed the outlook in the field of raw material supply.

A full day in the program was devoted to technical sessions and round-table discussions on problems and policies in mill operation. Subjects selected for these meetings were sulphite, kraft, paperboard, plant and power engineering, high-yield pulping, paper converting, production methods, and paper machines. Each session featured papers presented by authorities in the respective fields, followed by question-and-answer sessions.

Highlight of the convention was the election of Gordon K. Singletary of Brunswick Pulp & Paper Co., Brunswick, Ga., as president. He succeeds Glen Sutton of Sutherland Paper Co., Kalamazoo, Mich. Mr. Singletary was formally elected to the presidency for the 1952-53 year at the business meeting which was held on the opening day. He received the gavel of his office from Mr. Sutton at the final banquet.

Elected chairman of the Industrial Affiliates Committee was Walter B. Morehouse of Nopco Chemical Co., Harrison, N.J.



NEW PRESIDENT Gordon K. Singletary addresses the closing banquet

Abrams warns against strong government

Blasting at the super-state and warning of the inevitable consequences to be found at the end of the road to socialism, Allen Abrams told the annual men's luncheon that in 1952 Americans will have perhaps their last chance to chose the kind of world in which their grandchildren shall live. Mr. Abrams, vice president of Marathon Corp., selected as the title of his address, "The Third Generation."

"In 1900," he declared, "government was little to be seen either in uniform or in the laws and penalties which it imposed. Incredible as it may seem, with a population of 75 million people, the cost of our national government was only a half billion dollars per year, and the national debt was little over one billion dollars. The word 'bureaucrat' was unknown. A man could start his business and run it with scarcely a federal official to be seen . . .

". . . Conscious of her obligations, the country went to war in 1917 that we might save the world for democracy. But we reached no solution, for the old European conflicts were not to be re-

MEN'S LUNCHEON head table included (l to r): W. K. Metcalfe, Glen Sutton, Allen Abrams, Gordon K. Singletary, and Bob Eminger

solved so easily; nor in World War II were we able to quarantine the aggressors successfully.

"Now once again we have elected to shoulder the responsibilities of the world. It is as though our neighbor's house catches fire. Having an antiquated water system, he call on us to put out the blaze. Then, with the conflagration under control, we find that our own house is afire on the inside; yet, with a curious sense of generosity, we continue to pour water on our neighbor's fire whilst our own home is in danger of burning down.

"... Steadily and without too much fanfare your federal government has (during the past 50 years) moved in to tax more of the earnings of the citizen. Then two decades ago, in a time of emergency, the executive branch commandeered from the Congress a substantial portion of the federal budget. Undoubtedly these men were motivated by high purpose, for they set up many necessary and worthwhile measures of relief and support. Had they stopped at that point, all might have been well. But the politicians had found a medium by which they could manipulate votes, and from that time on the medium has been used effectively.

"... Thanks to your tax dollars, more people are going on the federal payroll, thus to become tax-consumers instead of tax-producers. In 1944, the peak year of World War II, there were 1,250,000 civilians on the federal payroll. In 1952 ... this number has doubled to more than 2,500,000, and the list is going up at the rate of 1,500 persons every day. ... By such means the federal government has expanded needlessly and has taken from the states many of the functions given them by the Constitution.

"... In 50 years the United States has moved steadily away from the principles of individual freedom as conceived by the founding fathers, back toward the old European philosophy that the state is more important than the individual...

"... You and I are primarily responsible for what is happening. We have been negligent, slothful, unwilling to accept our responsibilities as citizens. If our country is now to be saved—and I measure these words—you and I alone can save it. Believing that our system is the best, then each of us must become the finest salesman in the world. ... We shall do this simply and honestly, admitting our shortcomings but declaring that no other system yet devised has offered such freedom and opportunity as we enjoy.

"... Let each man of us choose, in the American tradition, the party and the candidates who best represent the principles for which he stands. Then let each one of us go to work. For in this year of 1952 you and I shall determine the kind of world in which our grandchildren — the third generation — shall live."

Open house, finances and industrial relations

First "working" session of the meeting was a general conference forum on "The Paper Industry on Parade." Featuring three papers on widely varying aspects of pulp and paper manufacture, the session was called to order by Chairman Glen Sutton of Sutherland Paper Co., Kalamazoo. Serving as co-chairman was W. K. Metcalfe of J. O. Ross Engineering Corp., New York, N.Y.

Open House at Thilmany—Public relations work at Thilmany Pulp & Paper Co., Kaukauna, Wis., was described by Paul West in a paper prepared by Charles R. Seaborne. In an effort to create good relations between the company and the general public, Mr. West said, it was decided to stage an open house at the mill. Backed up by an opinion poll showing the public's desire to participate, Thilmany planned many months in advance for the mill tours which eventually attracted more than 2,000 visitors from 16 states and three foreign countries.

Five tours were staged each day during the two weeks of the open house, with each tour lasting two hours. Guides were provided for each six or seven persons. Short talks were given by various Thilmany executives prior to each tour, and signs were posted throughout the mill to show specific equipment and processes of special interest to the public. Booklets describing the entire mill operation were given all participants. "As a result," Mr. West concluded, "we feel certain that this open house was a tremendous success."

Financial Aspects of Paper Mill Operation—The importance of a knowledge of finances to the success of any mill superintendent was discussed by Milton J. Hayes, assistant vice president of the American National Bank & Trust Co. of Chicago. "Financial aspects cover all the complicated processes leading up to the production line, the production line itself, and the sales effort," he declared. "Perhaps I make it sound like the most important element in papermaking—al-

Walter B. Morehouse, new Affiliate chairman

Harry E. Weston, secretary and treasurer

THE PAPER INDUSTRY ON PARADE was the interest of these men as they participated in the opening forum (l to r): C. F. Raber, W. K. Metcalfe, and Glen Sutton

HUMAN ENGINEERING was discussed by these men during the second general forum (l to r): Sydney Ferguson, A. E. Bachmann, Paul L. Phillips, A. W. Plier, Phillip J. Bowen, and Robert A. Huston

TRADE CONDITIONS took the spotlight in the third forum. Participants were (l to r): Walter B. Morehouse, E. P. Gillan, Gordon K. Singletary, Allan Hyer, John Walsh, A. I. Sippola, and James Ritchie

though I am sure that you gentlemen know that the successful operation of the mill is the most important element in papermaking. However, financial aspects and competent managerial direction are so closely interwoven that a successful top manager must master both."

The speaker urged superintendents to broaden their outlook and view the general "business landscape" so as to be better equipped to deal with operational problems. Without a continuous flow of money and credit to any mill, Mr. Hayes explained, there would be no funds to secure the large quantities of raw materials, labor, fuel, power, and processing supplies needed for operation. Production must eventually be reduced to an impersonal, cold set of figures—figures showing dollars and cents of income and expenditures or profit and loss statement, figures showing assets and liabilities, and figures showing the degree of efficient operation.

"The banker," the speaker continued, "has no other way of knowing your company and your operation, except by a study of the financial reports, and the continuous flow of money depends on the reaction of such individuals to the financial data. It is therefore incumbent upon you (the superintendent) to become interested in balance sheets and profit and loss statements; to be able to judge your own operations from such statements; to be able to make comparisons with other companies in the business, and to draw general and specific conclusions."

Mr. Hayes listed five sources from which the superintendent may acquire information that will help guide him in financial problems, while also listing the following ratios indispensible to any thorough financial study: (1) current assets to current liabilities; (2) net profit on net sales; (3) inventory to net working capital; (4) inventory to current assets; (5) cash to current assets; (6) current debt to inventory; (7) average collection period—days; (8) current debt to tangible net worth; (9) per cent federal taxes to gross income, and (10) ratio sales to total assets. "In addition to the above guides," he continued, "one should remember that in the paper industry there are certain factors peculiar to the industry. The heavy costs for production equipment and machinery—costs that mean an investment of over $27,000 per worker compared to an average of about $7,000 per worker in other industries."

In discussing the future of the industry, Mr. Hayes said that "the present trend . . . is for somewhat lower business activity in the paper industry (in 1953) and probably in general business, and until something happens to change the elements making up this trend, caution must be exercised. This is the time to watch for efficient changes that can be adopted to improve the profit margin—to spend more hours reviewing all controllable operations such as material purchase programs and wasted labor motion. This is the time to exercise judgment and mild caution."

Industrial Relations and the Mill Superintendent—Concluding the opening forum, C. F. Raber, director of industrial relations for American Box Board Co., Grand Rapids, told the delegates that "the measure of success as managers depends on how well we mold the attitudes of our people, how well we influence them to do a good job, to have a sense of team play, to look beyond the next paycheck. The industrial relations problem, boiled down, is 'how do we change the attitudes of our people.'"

The speaker expressed the opinion

WOOD PULP is discussed by James Ritchie at the forum on trade conditions

CLAY SUPPLY was the subject of a talk given by O. W. Callighan at a general forum

NEWSPRINT problems are reviewed by Harry Weston

that industrial relations is the superintendent's greatest responsibility. "Top management must keep him (the superintendent) well informed so he will clearly understand what is expected," Mr. Raber declared; "what he is to accomplish, and the manner in which he is to get it done. He must have the knowledge and information—you can't do a good job working in the dark! He must know the company's problems, objectives, and plans, and the policies and procedures to be used in carrying them out."

The superintendent must, on the other hand, keep the men under his direction as well informed as he, the speaker continued. The foreman is the key, and giving him information is not enough. He must be told how to deal effectively with the employees; they must be accurately informed about those things that affect their everyday working life. Whatever it is, just telling them is not enough. They want to know why.

"You, the superintendents of your respective companies," Mr. Raber concluded, "can see that your foremen are

RAW MATERIALS FOR coloring are discussed by Fred Soderberg of General Dyestuffs

properly equipped and do their job; and when you have done that, you will have reached your objective. You will have developed a new employee attitude."

Management, labor and safety

Continuing the program of industry forums, the second general conference keynoted "Human Engineering." Serving as chairman was A. E. Bachmann of Missisquoi Corp., Sheldon Springs, Vt. Co-chairman was A. W. Plier of D. J. Murray Mfg. Co., Wausau, Wis.

Responsibility of Management Today—The seven problems of management in the paper industry today were outlined by Sydney Ferguson, chairman of the board of The Mead Corp. and president of the American Paper & Pulp Association. These problems, he said, are: (1) a supply of wood and other materials, (2) water, (3) labor, (4) taxes, (5) capital funds for building, (6) the ability to operate at a profit, and (7) a good site.

Discussing the first factor, Mr. Ferguson declared that "in order to make sure that there will be adequate supplies of pulpwood—that these supplies will continue to be ample for many years—and their initial cost plus deliveries to the mill must be reasonable—surveys must be made and cruises conducted."

"Our second problem is that of water," he continued, "... water first for processing; secondly for transportation, and thirdly for removal of mill wastes."

"Our third problem is labor. The pulp and paper industry is, in my judgment, particularly fortunate in that most of its operations are carried on in small communities, and its labor, especially its skilled labor, is of high caliber. Members of strong and sound unions for many years, papermakers are stable American citizens who, for the most part, own their own homes and have a strong stake in the welfare of their community and their nation. Such people can, of course, be found most anywhere in the United States, so that management's problem here is merely to be sure that the labor force available for the new mill is adequate."

Speaking of the place of taxes in the over-all management problem, Mr. Fer-

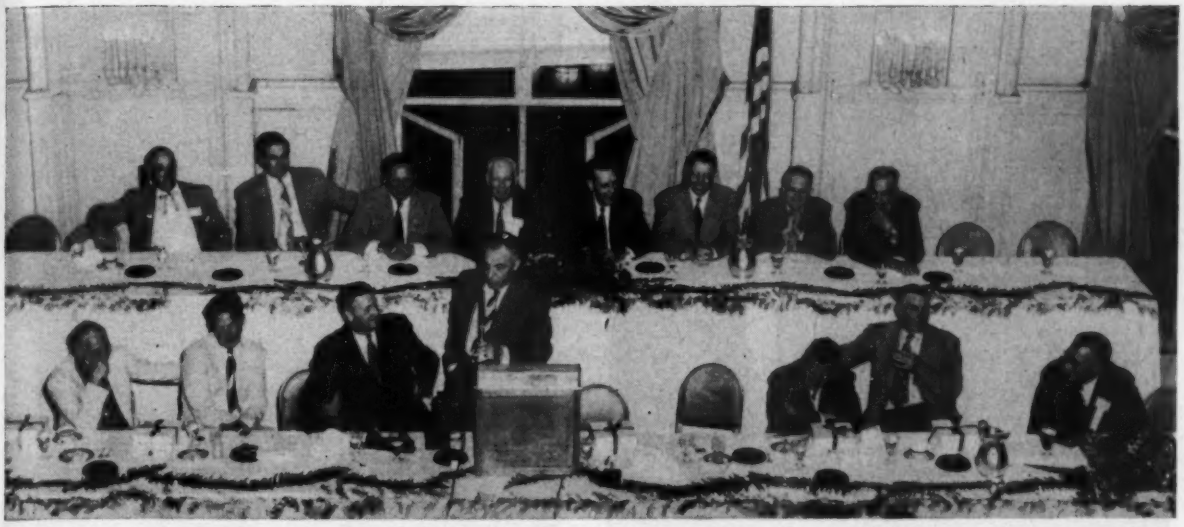
PAPERBOARD SESSION featured a talk by Peter R. Scott, C. B. Cottrell & Sons; chairman of the meeting was H. E. Hadley of Gardner Board & Carton (right)

LIQUID VOLUME and liquor concentration discussed by R. H. Worrell of Southland Paper Mills at the Kraft session; to the left is R. C. Bullock, Ecusta

VALVELESS VACUUM DECKER is described at the sulphite technical session by J. K. Perkins of Impco; Gordon Morseth of Detroit Sulphite is to the left

PACKAGE DESIGN is the subject of a paper by Rex Paxton of Sutherland Paper at the paper converting session; Howard Street, National Vulcanized Fibre, is at left

INCREASED PRODUCTION is analyzed by J. R. Curtis of Scott Paper at the technical session dealing with plant and power engineering



BASEBALL WAS THE CENTER of interest at Wednesday's banquet. At the front table are (l to r): Bill McCory, travelling secretary of the New York Yankees; Lyall Smith, sports editor of the *Detroit Free Press;* Norman O. Weil, master of ceremonies; Ford C. Frick, commissioner of baseball; Walter O. Briggs, owner of the Detroit Tigers; Casey Stengel, Yankees' manager, and Gordon K. Singletary. Rear table: A. C. McCorry, chairman of the Superintendents Pacific Coast Division; Paul West, Northwestern Division; Richard H. Peeters, Michigan Division; Harry Weston, secretary and treasurer of the national association; Glen Sutton, national president; Cecil B. Curry, Southeastern Division; Alfred Montagna, Connecticut Valley Division, and James M. Wishart, Northeastern Division

guson stated that "this (taxes) is indeed a real handicap. The remedy, of course, is to seek and seek vigorously a reduction in federal expenditures and, in so doing, we must remember there are some things we would like to have that we will have to do without. We can't expect to have federal taxes reduced if we rush down to Washington, hat in hand and yelling for help, at every turn in the business cycle."

Investment and profit were considered by the speaker as almost inseparable in considering management's problems. "... Certainly we cannot expect people to invest their money without reasonable prospect of a fair return," he said, "because in addition to entrusting the money to us and permitting its use for all the expenditures connected with the venture, there is always the risk that it may not turn out a success.

"Will the new venture be profitable? This problem, like all the others, is not as simple as it sounds. We must estimate what our product will cost, forgetting none of the items of construction, raw materials, labor, transportation, taxes, depreciation, depletion, interest, selling, administration, etc., which will go to make up that cost. Having done this, we must have reasonable assurance that there will be a demand—note the word—for the product at a price which will cover the cost and leave a margin to pay the owners a fair return on their investment."

"... My seventh problem I have labeled 'a good site.' Picking a site obviously involves consideration of most of the other factors—taxes locally, labor supply, climate, wood supply in the vicinity, distance from markets, distance from other materials, water conditions, etc. It also has to do with the responsibilities management has towards the community in which those workers live. Is this site in or near a healthy, well-run community? Then its populace will be dependable, resourceful, and competent people; it will be clean, attractive, and law-abiding; it will have schools, churches, hospitals, good police and fire departments, playgrounds, parks, and other means for recreation."

"It (a business) must create an atmosphere in which the organization will work harmoniously, intelligently, imaginatively, and happily—in short, it must create morale. Here, in the field of human relations, lies the acid test of good management."

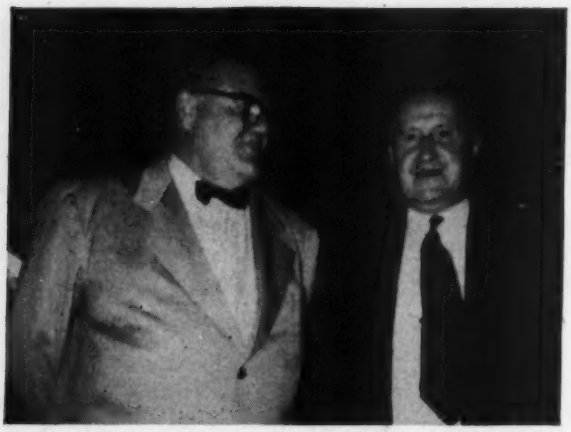
What Labor Unions Have Meant to the Paper Industry—Calling collective bargaining an advantage to both union and management, Paul L. Phillips, president of the International Brotherhood of Paper Makers, Albany, N.Y., declared that as a result of such an instrument wages, production, and profits have been increasing steadily for a number of years.

"This being true," Mr. Phillips declared, "collective bargaining has four or five advantages both to the company and to the workers: (1) It produces a logical structure of wage rates, and a better balanced wage schedule between all companies. . . . (2) With high wages and a logical rate structure, the industry is attracting a high degree of intelligence and skill among its workers. . . . (3) Aggressive representation of the workers in the paper industry provides a spur to efficient management. . . .(4) With day-to-day collective bargaining a reality, the irresponsible, tyrannical supervisor, who considered himself king of all he surveyed, is becoming a thing of the past. . . . And (5) management in organized mills has an excellent line of communication to and from its employees; it is a simple matter to find out what its workers are thinking, what they want; it is not necessary for the company to use stool pigeons to find out; the union committee will tell them, officially and in much greater detail."

Discussing progress in achieving higher wages, Mr. Phillips emphasized that "... as our wage levels rise, your (superintendents) salaries will rise also —that as we get more vacations and holidays, you will too. Lately, there has been much stress on pension and welfare plans, and we hope that capillary action works there, too."

Mr. Phillips, acknowledging that unionism is not above criticism, listed some corresponding criticisms of management: paternalism, lack of a true understanding of the worker as a human being, allowing personal feeling to influence decisions.

"I have often wodered," the speaker continued, "why management does not inaugurate and carry through a continuing program of training for the supervisory staff in the art of harmonious labor relations. The unions have shown that such a program will work. . . . I am convinced that sound labor relations are the rule, rather than the exception, in the paper industry; but the job will never be complete. Labor-management relations in our industry have often been cited as a model for others to copy. Let us not get so close to the trees that we cannot see the forest. . . . Both manage-



GETTING TOGETHER at the get-together party were A. E. Bachmann of Missisquoi (left) and R. G. MacDonald of Tappi

PAST PRESIDENT Ed Coughlin chats with Mrs. Coughlin (left) and Mrs. Glen Sutton, wife of the 1951-52 president

GOOD FELLOWSHIP at the pre-banquet party; Mr. and Mrs. C. F. Farrell (left) and Mr. and Mrs. H. E. Nelson

"EYES LEFT" seemed to be the command when this candid was taken; to the left is S. I. Aronovsky, Dr. J. A. Hall is at the right

ment and labor must apply to day-to-day problems all the energies and skills we possess. If our capitalistic system is to survive, we must have both truly free enterprise and real industrial democracy. Our whole industrial system is operating in sort of a goldfish bowl. The system is on trial before the court of public opinion and the peoples of the world. Their decision will be based upon what we do, and not upon what we say. The Paper Makers pledge our full support to the end that this decision will be a favorable one."

Getting Employees to Think—Robert A. Huston of Fuller Mfg. Co., Kalamazoo, warned against ignoring the intelligence of the worker. "If we are to be most effective in our supervising, or in selling an idea, or in developing peace and harmony between ourselves, our workers, within our families or between nations," he declared, "we must be prompted by motives that are consistent with what we do and say. We must want what we want.

"Our employees can only think constructively in terms of what they know and what they have experienced. We have the obligation to see that they have the right kind of knowledge and the right kind of experiences. The atmosphere of their work environment is the back drop against which their association with management—even with industry, as we know it—takes on meaning. Therefore, if we are going to try to get our people to think in harmony with our thought, then we must provide them with the same basic information that we possess as a starting point.

"It may be very illuminating to us when we soberly reflect on the advisability of revealing the basis for our thoughts. If we find we must hide them, are we being honest? If we are unable to make a clean breast of it, do we want our employees to think, or do we want them to parrot our thoughts? In the final analysis, for the future of industry, we had best stimulate our thinking, even though the revelation of our underlying reasons requires a personal compromise or adjustment—even though it requires us to expose our motives.

"In conclusion, I think that getting employees to listen and think requires that management be willing to listen and think. When this occurs, we will have attained a maturity in industrial relations, which means that the parties to the employment relationship will have become mature."

The Key to the Safety Program—the Foreman—Outlining the responsibilities of the foreman, Phillip J. Bowen of Great Lakes Steel Corp., Detroit, listed the following: (1) the physical condition of his department and related territory, (2) the proper care and maintenance of all equipment that he uses, (3) quality production at minimum costs, and (4) the building of a well-integrated, trained, productive group of workers who are safety-minded.

Describing the almost unbelievable number of men and women injured each year in industrial accidents, Mr. Bowen said that management has at long last come to realize that a functioning safety program can only be successfully operated when the foreman is given the responsibility for it. He declared that the foreman must always set the example and must gain the confidence and faith of each man.

"Departmental supervision is responsible for the successful operation of a safety program," he continued, listing the following as essential factors in such

a program: proper safety instruction; adherence to rules; complete understanding of rules; constant inspections for unsafe conditions; proper safety equipment; constantly safe working conditions; provision of adequate safety reports, statistics, data; periodic meetings; safety consciousness among supervisors; cleanliness and orderliness, and complete and accurate accident reports.

Machinery, newsprint, chemicals and wood pulp

The program of general conferences during the 33rd annual gathering of the Superintendents was brought to a close by a forum on "Trade Conditions." Participating as chairman was the new national president, Gordon K. Singletary of Brunswick Pulp & Paper. His co-chairman was E. P. Gillan of Anheuser-Busch Inc., St. Louis.

Pulp and Paper Mill Machinery—Indicating that paper mill machinery manufacturers are prepared for quick conversion to war production, Allan Hyer of The Bagley & Sewall Co., Watertown, N.Y., declared that these manufacturers are ready to continue production for the industry as long as conditions allow. However, he added, there may be delays because of such domestic problems as strikes, material shortages, government regulations, etc.

Since any war economy requires vast amounts of paper, the speaker explained, it is necessary to have men in Washington who know the industry and who can efficiently guide that industry through the red tape of bureaucracy. No one can predict exactly how much paper would be necessary to a war effort, but men who have served and are serving the NPA have a good idea.

The Chemical Situation (a Panel)—Leading a roundtable discussion on the current chemical supply situation was Walter B. Morehouse of Nopco Chemical Co., Harrison, N.J. First participant was Robert L. Schuerman of A. E. Staley Mfg. Co., who reported that starch is in plentiful supply and that the current corn crop promises to be one of the largest in history. He added that during the years 1945-52 a total of $98,000,000 was spent by the four largest starch manufacturers for expansion of plant capacity.

Fred A. Soderberg of General Dyestuffs Corp. spoke briefly on raw materials for coloring. He said that at the present time they are in abundant supply. O. W. Callighan of Edgar Bros. Co. declared that at the present time the clay business is good, adding that the supply and transportation situations are equally favorable, with plant capacity altogether adequate.

A. I. Sippola of Socony-Vacuum Oil Co. Inc. declared that although the demand for petroleum products should increase 3 to 4 per cent per year for the next several years, production capacity expansion will be able to keep pace. Wax requirements, he said, should be met to the paper industry, and do not pose a great problem.

During the convention it was determined that the 1953 meeting will be held at the Atlanta Biltmore Hotel, Atlanta, Ga., June 9-11. This will be the fourth time that a national gathering of the Superintendents Association will have been staged in the South. Meetings were held in Richmond, Va., in 1927 and 1935 and at New Orleans in 1948.

J. M. Walsh of American Cyanamid Co. called urea resins in adequate supply, while melamine expansion, which has been 500 per cent since 1945, continues. Urea cost is "at rock bottom," he said, and melamine cost may come down. Other chemicals he listed as in good supply and at low cost are nitric acid and sulphate of alumina. Discussing sulphur, Mr. Walsh declared that in recent months there has been a reduction in demand, and that with the increased use of pyrites there is a fair outlook for 1953. Concluding the chemical panel was a paper by Vernon Woodside of Mathieson Chemical Corp., who reported that the chlorine business is currently good. With an increase in capacity, he said, there has been a corresponding decrease in demand among the consuming industries. Insecticide requirements may reduce the supply temporarily, but production promises to remain in good balance.

Newsprint Production will meet Demands—Vernon L. Tipka of the Newsprint Service Bureau reported favorably on the ability of newsprint manufacturers to meet an ever-increasing demand. "The productive strength of the newsprint industry," he declared, "lies in a relatively high capital investment per employee and in the stable managements of its individual company segments."

Reviewing the past record of the industry, he said that "the utilization of a high percentage of skilled workers and a comparatively high employment of technical personnel have contributed to the development and maintenance of the newsprint production records of the past. . . . The ever-present threat to the newsprint industry is the ever-increasing burden of government taxes. This is not only a direct burden on the newsprint companies; but it affects also the income of every employee and increases directly the cost of newsprint to the American publishers." Mr. Tipka said that the tax burden on newsprint is likely to go higher, adding that on an average modern newsprint employee basis, taxes levied by the government are greater than the average pay per employee, and are much greater than that retained by the company for expansion, for the purchase of cost-reducing equipment, or for dividends.

The speaker reviewed the current tremendous cost of establishing a new mill and listed progress made toward the government's goal of further expansion totaling 120,000 tons.

"Our own study of the newsprint demand situation," he continued, "for the immediate near future of 1952-53 does not indicate a deficit in the proportions predicted by the government agency (DPA). Both the Canadian and the United States newsprint industries are currently operating slightly above capacity; and, in all likelihood, will continue to do so and should be capable of meeting any immediate emergency in the near future. The certificates of necessity already granted by the government, when completed, will increase the United States newsprint capacity to 1,540,000 tons annually. When this tonnage is attained in the U.S., it will better the production of any year since 1926."

The Place of Wood Pulp in the American Economy—In a report to the forum meeting, James Ritchie of the United States Pulp Producers Association Inc. said that four pulp-dependent industries—paper, rayon, printing and publishing, and converted paper products—account for 10 per cent of the economic wealth generated by American industry. They employ 8½ per cent of the wage earners, and their payroll is equal to 9 per cent of the American industry economy's payroll.

Mr. Ritchie stressed the fact that there is no better example of the efficient use of a basic natural resource than in the pulp-consuming industries. However, he suggested two methods by which the long-range need may be better satisfied: (1) more effective utilization of available forest land, and (2) more complete utilization of the supply of wood. He pointed out that the yearly growth is much greater in volume than it was 50 years ago.

He listed factors resulting in an improved utilization as follows: (1) improved protection against fire, insects, and disease; (2) more extensive tree-planting programs; (3) more intensive forest management programs, and (4) more energetic efforts to acquaint the public with the need for forest conservation.

Improvement projects in wood utilization have been of two types, he continued: (1) programs designed to broaden the range of wood species suitable for use in pulp manufacture, and (2) programs designed to insure more complete utilization of the pulpwood

(Continued on page 514)

Behavior of paper under stress

GEOFFREY BROUGHTON*

MOST PAPERS AND PAPER PRODUCTS are relatively stiff materials, usually having high moduli of elasticity but not obeying Hook's Law (i.e., stress proportional to strain or deformation proportional to force applied) throughout their entire stress-strain diagram to the breaking point. Most textiles, rubber, leather and other high polymeric materials show behavior similar to paper, the stress-strain diagram being nonlinear. Thus, it is necessary to know completely the whole load-elongation function. Not only does the line showing the relationship between stress and strain give important information, the area under the line is a direct measure of the energy-absorbing capacity of the specimen under test.

Work or energy = force × distance = load × elongation. This energy may well be connected with such usage properties as softness, web breaks, bag resistance to tear, board bender, etc.

The elongation of paper at the breakage point is normally small, less than 5 per cent, hence precise measurement of the stress-strain diagram has until recent years not been accurately obtainable via conventional pendulum-type testing machines. However, the recent development of machines capable of following accurately under controlled conditions the load-elongation phenomena has led to a revival of interest in the subject of the mechanical behavior of paper, particularly in Sweden (*5, 6, 7*) and England (*4*).

Pendulum tester

The ordinary pendulum tester suffers from several defects. First, it is unable to magnify the extension axis, although it may be possible to overcome this by attachment of electronic amplifiers and recorders. Second, the pendulum cannot swing back and register reductions in load because of the ratchet action. Third, if the ratchet is not used, the heavy pendulum weight causes a large damping effect which destroys sensitivity, the system becoming very sluggish. Fourth, and perhaps most important, pendulum testers are neither constant rate of load nor constant rate of elongation instruments, though the pulling jaw does travel at a constant rate. This would be of little importance for Hookean, perfectly elastic materials, but is important for materials such as paper where time is also a variable in the stress-strain behavior.

Fig. 1 shows the Instron tensile tester (*3*), in which the deformation is at constant rate, while the stress-strain diagram is drawn automatically. Simultaneously, the area under the diagram or work done to break can be automatically recorded. It is hoped that this article will serve to indicate the type of curves obtainable on this machine and perhaps point out some of the possibilities thus opened up in the study of the deformation of paper when strained, either to the breaking point, or submitted to a series of straining cycles, which fall short of the final breaking elongation.

The instrument (Fig. 1) consists essentially of two jaws, between which the specimen is clamped. In the experiments to be described the paper strip was 2 inches long and ⅜ inch wide, although strips 10 inches long could be easily accommodated. The lower jaw is attached by means of a bayonet-type coupling to a crosshead which is driven at constant speed by two worm gears. Change gears which readily allow the crosshead speed to be varied in 11 steps from 0.02 to 20 inches per minute are available. The upper jaw is essentially a stationary member attached to a bonded-wire strain gage, which is connected in the arms of a Wheatstone bridge circuit, operated from a highly stabilized 300-cycle oscillator. The signal is amplified and transmitted to a high-speed potentiometer recorder, into which is built a mechanism for driving the charts synchronously at speeds ranging from 0.2 to 50 inches per minute. A series of strain gage cells, capable of measuring loads from a few grams to several thousand pounds per square inch, is available. By additional controls on the servocontrolled drive, the crosshead may be started, stopped and reversed almost instantly, either automatically or by manual means. This allows the sample to be automatically cycled between any desired limits of load or elongation for as many cycles as desired, or the stress relaxation to be measured at any preset elongation, in addition to the determination of the simple stress-strain curve at constant rate of strain.

Time lag

With paper at the higher speeds of the machine, 5, 10, 12 and 20 inches per minute, the machine has a definite time lag. Response of the strain cell is satisfactory, but the recorder pen possesses a speed of response which is not entirely suitable for all work. According to the manufacturer, the stress-strain curve drawn will have an error of 1 per cent or less of full scale if 5 seconds or more are consumed as the pen travels the full width of the chart. The experimenter, therefore, should make trial runs and calculations to determine the safe upper limit of elongation rate. Increased strip length (i.e., distance between jaws) or papers with high ultimate elongation may allow higher speeds to be used. Most of the curves illustrated were run at a rate of elongation of 0.5 inches per minute. Reproducibility of curves obtained on the instrument, together with the effect of rate of elongation, has been described elsewhere (*2*).

Fig. 1—Instron tensile tester

Fig. 2 shows stress-strain curves obtained on a blueprint paper weighing 20 pounds per 1000 sq. ft. Figs. 3 and 4 obtained on the machine and cross-direction of a kraft wrapping paper, 14.0 pounds per 1000 sq. ft., show how the rate of travel of the chart and load scale can be adjusted so that full scale deflections, with consequent higher accuracy, are obtained.

Figs. 5 and 6 show curves obtained on bleached kraft handsheets, 28.2 pounds per 1000 sq. ft., which had been made from the same pulp beaten for 30, 60, 90 and 120 minutes. It is interesting to note that the curves consist essentially of three portions, an initial, short, rapidly rising section, a straight line intermediate section, and a final curve section where elongation increases rapidly without a proportionate increase in load. The initial portions of the curves are essentially similar, and the slope of the straight line part of the curve is identical for all beating times. Figs. 7 and 8, showing analogous curves for high grade bleached sulphite handsheets, 28.0 pounds per 1000 sq. ft., also show a common slope for the straight line portion of the stress-strain curve. Interestingly enough, it is almost identical with the slope of the kraft handsheets;

*Department of Paper Engineering, Lowell Textile Institute, Lowell, Mass.

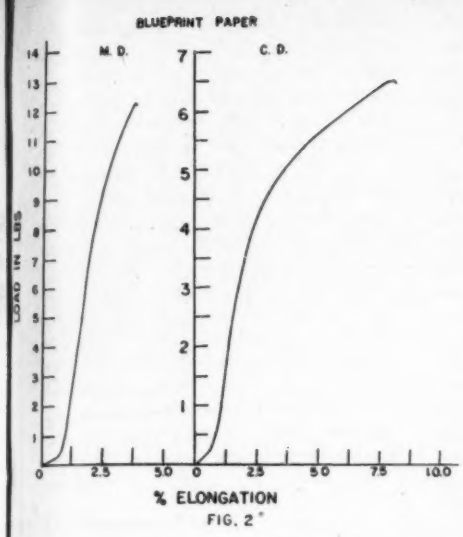


FIG. 2

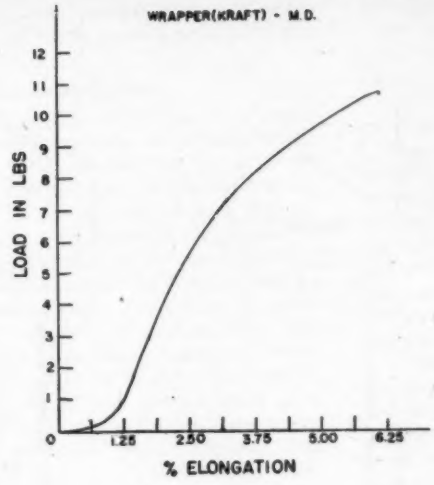


FIG. 3

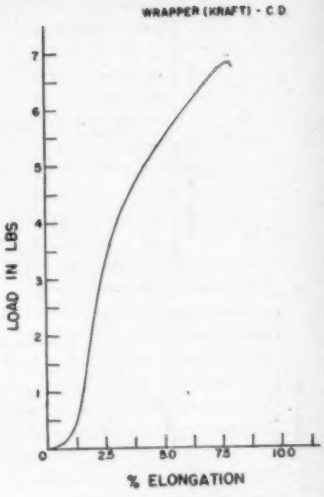


FIG. 4

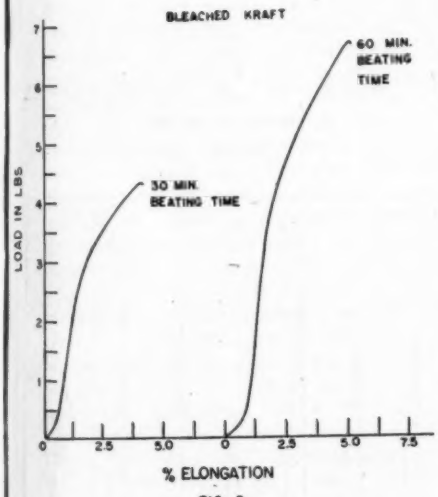


FIG. 5

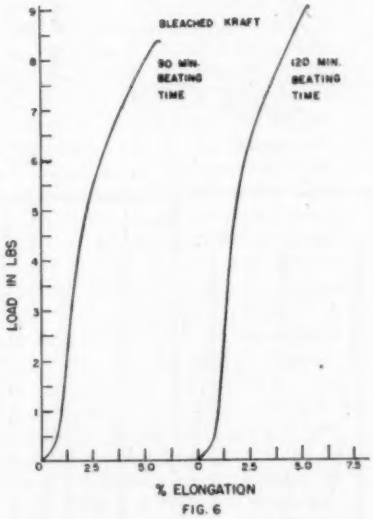


FIG. 6

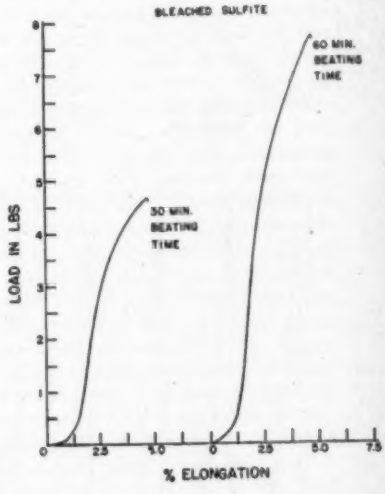


FIG. 7

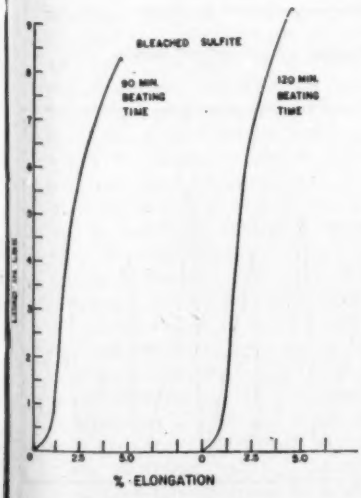


FIG. 8

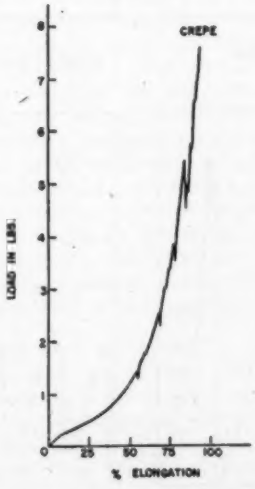


FIG. 9

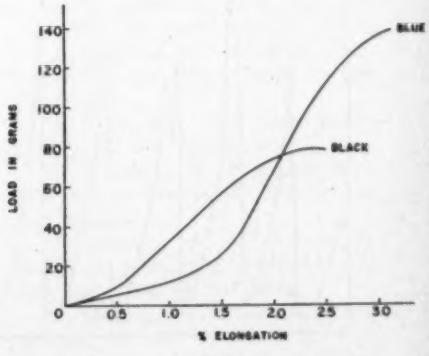
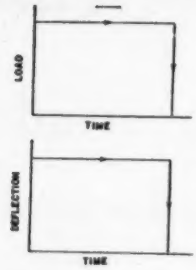


FIG. 10



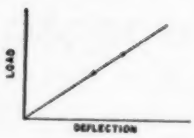
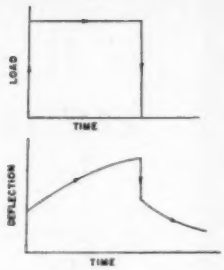


FIG. 11



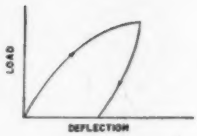


FIG. 12

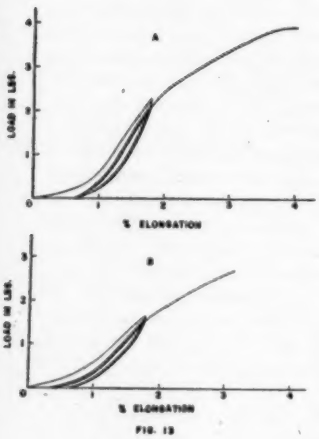


FIG. 13

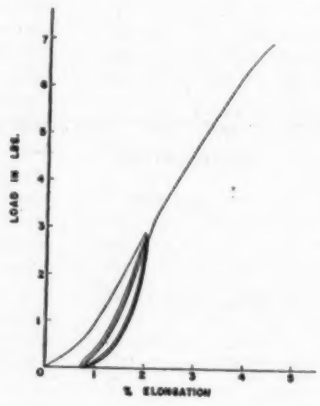


FIG. 14

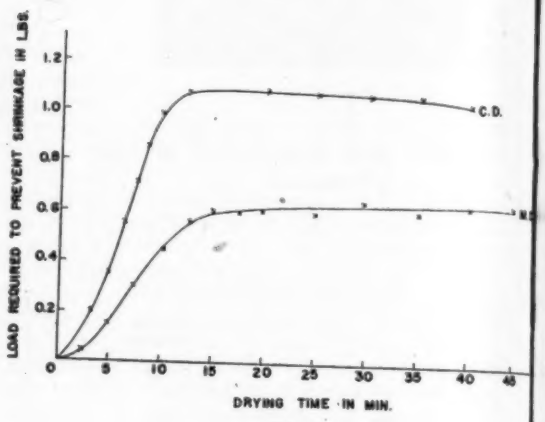


FIG. 15

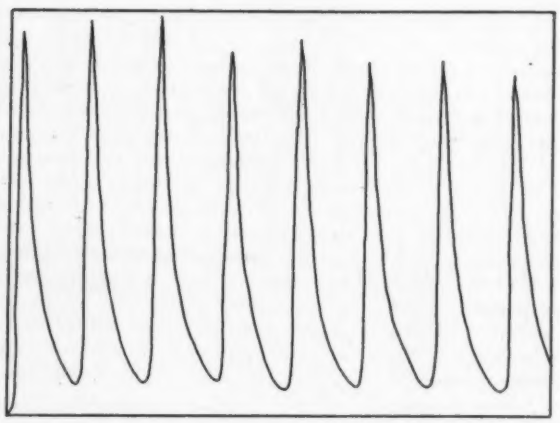


FIG. 16 TYPICAL PEEL TEST DIAGRAMS - CLEAN & UNIFORM

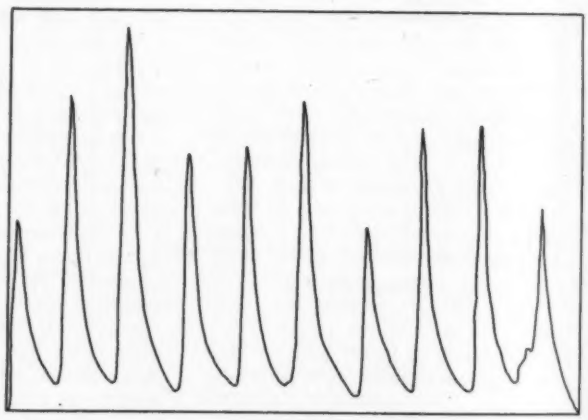


FIG. 17 TYPICAL PEEL TEST DIAGRAMS - CLEAN BUT NOT UNIFORM

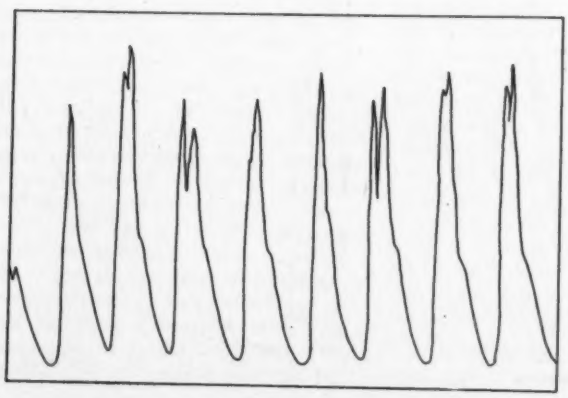


FIG. 18 TYPICAL PEEL TEST DIAGRAMS - UNIFORM BUT NOT CLEAN

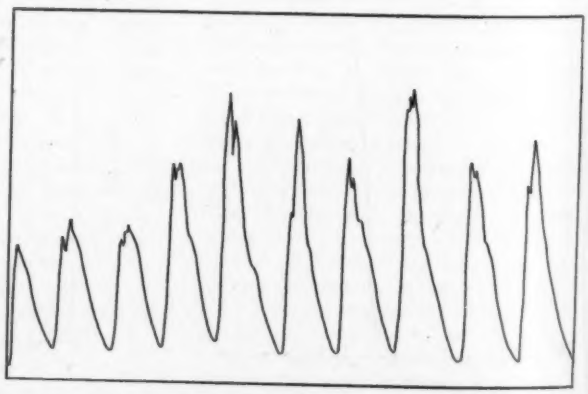


FIG. 19 TYPICAL PEEL TEST DIAGRAMS - NEITHER CLEAN NOR UNIFORM

machine made papers also show this tendency to give a straight line over a portion of the curve. It may be that the slope of this straight line section could be made to give a useful indication of some of the usage properties of a paper.

A creped paper, 42.5 pounds per 1000 sq. ft. and with about 90 per cent crepe, gave the jagged curves shown in Fig. 9. Creping increases the energy absorption up to break. This is most important for papers (e.g., bag papers) where a sudden shock must be absorbed and distributed without increasing the stress to the rupture point. A weak paper, such as the creped paper, may yet be more suitable for some purposes than a stronger paper with a lower energy absorption to break.

Strain-gage

By use of a more sensitive strain-gage, it is possible to follow the stress-strain behavior of even a piece of water impregnated tissue. Fig. 10 shows a comparison of two wetted spinning paper tissues, each having a basis weight of 5.2 pounds per 1000 sq. ft. The difference between the two tissues, even though the breaking load is only a fraction of a pound, is clearly seen. The curves are for the machine direction.

Thus far, we have considered only the simple stress-strain curve and not looked into the phenomena occurring when the paper is freed from all or a portion of the applied stress. Perfectly elastic materials, such as steel below its elastic limit, always give a straight line for the relationship between load and deflection, irrespective of elongation rate. Such behavior is shown in Fig. 11. Paper, however, is an "imperfectly elastic" material and, as such, shows the type of behavior of Fig. 12. When a load is applied there is first an instantaneous deformation followed by a slower deformation, the rate of which decreases gradually with time. When the load is removed, there is an immediate contraction equal in magnitude to the immediate deformation obtained when the load was applied. This is followed by a slow contraction or creep, which for most non-elastic materials continues for a long period of time and is never complete. This slow contraction is sometimes known as secondary creep, the deflection remaining immediately after the removal of the load being a function of this secondary creep.

In other words, there are three principal components making up the deflection shown in any paper stress-strain curve. They are (a) the immediate, instantaneously recoverable, elastic deflection, (b) the delayed but recoverable elastic deflection, and (c) the delayed non-recoverable deflection. It is the dependence of the last two on time which makes the interpretation and understanding of the paper stress-strain curve difficult.

Instron investigation

The Instron allows the investigation of such stress-strain phenomena, though in a little different manner, since the load must be removed gradually as the cross-bar is returned to zero. Fig. 13 shows cycling curves for two tissues, 5.2 pounds per 1000 sq. ft. The paper strip was first elongated 1.8 per cent and the cross-head then returned at the same speed to zero elongation. The load dropped to zero at 0.55 per cent elongation for paper "A" and 0.45 per cent for paper "B." These may be taken as a measure of the secondary creep under the maximum loads applied, 2.22 pounds and 1.65 pounds respectively. The paper strip was again elongated without any rest period, this time tracing a significantly different curve from that obtained in the first elongation. The load required to attain an elongation of 1.0 per cent is approximately 31.5 per cent less in the case of "A" and 36 per cent less in the case of "B," although on the initial deformations both required the same load to reach 1.0 per cent stretch. On the return cycle the pen traces practically the same curve as the initial cycle, though it is distinguishably lower. Zero load is attained at the same permanent set with no measurable difference, and the third upward cycle is very close to the second, although measurably lower. Paper "A" now requires 37 per cent lower load than it did on the original cycle to reach 1.0 per cent elongation, paper "B" requires 42 per cent. The third downward cycle is almost identical with the second and the same permanent set is indicated. On the fourth upward cycle, which was still closer to the third than was the third to the second, the cycling was discontinued and the cross-head allowed to move downward until break finally occurred.

It will be concluded from this experiment that, for paper, secondary creep is almost removed after one loading and unloading cycle, but that it can be quite important for papers which have to undergo a stretching cycle during use. Two papers which show completely dissimilar breaking strength and elongations may yet show very similar stress-strain curves at low elongations. The importance of this for papers to be handled by automatic machinery (e.g., in box making or packaging) is obvious.

Paper yarn recovery

In paper yarn recovery behavior may be equally or more important. During the spinning operation, the paper ribbon is continuously under tension, and some tension may also be applied during weaving, if such is the ultimate use of the yarn. No doubt some of the apparent anomalies between behavior and apparent tensile strength might well be solved by a thorough study of cycling curves such as that shown in Fig. 14 for a typical paper twine yarn with 4.5 twists per inch.

Another interesting adaptation of the Instron is to follow the load required to prevent shrinkage of a paper sheet as it dries. When the paper is wetted, it expands (considerably more in the cross-wise than in the machine direction) and, if it is now placed between the tester jaws, the load required to prevent shrinkage as it dries can readily be measured (Fig. 15). It is considerably greater in the cross than in the machine direction. There is no further increase in load beyond the critical moisture content in the drying curve.

A last example of the use of the Instron tester is in the study of adhesion and adhesives (*1*). Figs. 16, 17, 18, and 19 show curves obtained from different pieces of single-faced corrugated board selected at random. The opposite sides were placed in the tester jaws so that they were peeled apart. As each corrugation ruptured, the pen of the testing machine reached a maximum, and when the bonded portion separated, the load fell off again until the next corrugation was brought into tension, when the load again built up. The four figures are distinctly different, illustrating four different bonding conditions. The peaks in Fig. 16 exhibit clean breaks and uniform strength. Fig. 17 shows clean breaks but variable strength; Fig. 18, jagged peaks and uniform strength; Fig. 19, jagged peaks and variable strengths. The latter is obviously the least desirable. Apparently these various possibilities in corrugated board manufacture here illustrated can all occur in production.

It is hoped that enough has been said to give some idea of the potentialities of the instrument and to suggest some fruitful lines of attack on problems of concern to the paper and paper converting industries.

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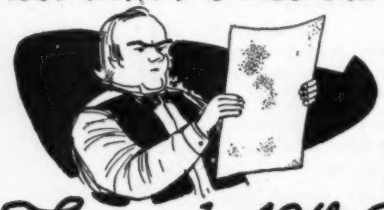
PAPER SKETCHES

BRYAN DONKIN, English builder of pioneer fourdrinier machines, took great care to keep wet paper from touching the iron parts of his machines, firmly believing that the rust spots common to English paper of the early 1800s came from contact with the machine.



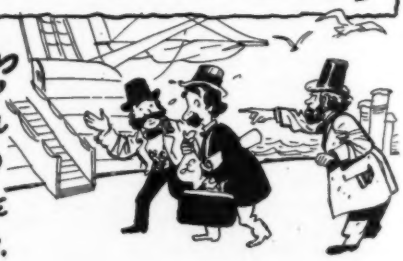
"The name **FOOLSCAP**" originated during the reign of Charles I, of England, when certain papermakers used a watermark depicting a fool with cap and bells to show their contempt for that monarch.

Odd Bits

CELERY growers of the Kalamazoo, Michigan, area are protecting their young celery plants with a special type of "tent paper" that actually forms a "tent" over the rows. A specially developed machine is used to roll the paper over the rows of celery.

The early 19th Century papermaker,

John Dickinson, accused Thomas Gilpin, American papermaker, of bribing a trusted Dickinson employee to come to America and bring with him the secret of the cylinder used in Dickinson's papermaking machine.



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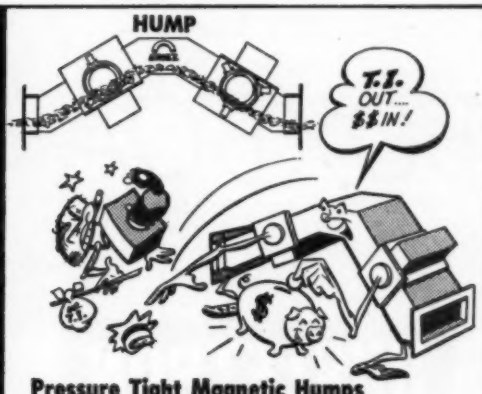

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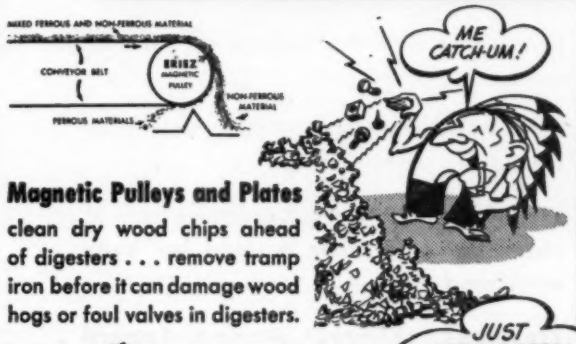

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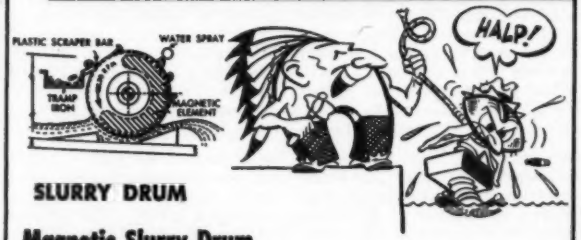
clean dry wood chips ahead of digesters . . . remove tramp iron before it can damage wood hogs or foul valves in digesters.



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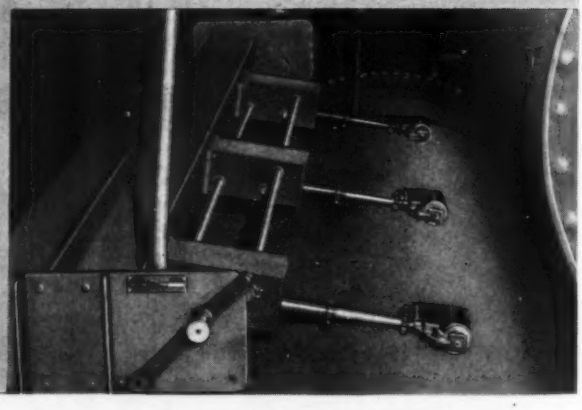

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IMPORTANT VARIABLES in sulphite pulping are discussed by members of the sulphite panel (l to r): R. K. Strapp, Pulp & Paper Research Institute of Canada; J. C. Benny, Diamond Match; R. deMontigny, E. B. Eddy; H. H. Sears (moderator), Price Bros.; Dr. Wilfred Gallay, general chairman, and J. S. Hart, Pulp & Paper Research Institute of Canada

Paper Technologists meet at Murray Bay

A. W. J. DYCK, Ph.D.
Consulting Editor

PROBLEMS ENCOUNTERED in pulp and paper manufacture were the subjects discussed by experts in the field who gathered at Murray Bay, Que., June 16-21 for two all-Canada meetings. The International Pulping Conference of the Canadian Pulp & Paper Association, staged June 16-18, was under the general chairmanship of Dr. W. Gallay, The E. B. Eddy Co., while the summer meeting of the CPPA Technical Section, which convened June 18-21, was under the chairmanship of H. C. Lee, Canadian International Paper Co. Some 650 delegates attended the two meetings, which were held at the Manoir Richelieu.

Basic properties of lignin in relation to pulping, diffusion and penetration mechanisms of liquids into woods, variables and high-yield sulphite and sulphate pulping, high-speed continuous alkaline pulping, continuous kraft processes, semichemical pulping, the use of the centricleaner developed by Howard Smith, and the manufacture of chlorine dioxide were among the highlights of topics discussed at the six-day meeting.

Pulp and Paper Industry in 1975

E. M. Little, president of Anglo-Canadian Pulp & Paper Mills, Ltd., who was presented with an honorary life membership in the Technical Section, estimated U.S. paper products consumption at 48,000,000 tons by 1975—an increase of 55 per cent over the 1951 consumption, which was 31,000,000 tons. The combined U.S. and Canadian consumption of paper products in 25 years, Mr. Little said, could easily reach 55,000,000 tons.

On the question of Canada's wood resources, the speaker drew attention to competent estimates which showed that Canadian forests—if properly managed and protected from fire and destruction by insects—could sustain two or three times the present drain on the country's forests.

Increasing demand for paper products will bring increasing utilization of hardwoods and other sources of cellulose. With the accelerated industrial expansion, industry also will have to pay increasing attention to a more rapid development of technical men and junior and senior executives, Mr. Little stated.

Lignin Properties

Dr. C. B. Purves, McGill University, described his experiment on the extraction of spruce chlorite holocellulose with liquid ammonia and the removal of a brown amorphous substance thought to be derived from wood lignin. The substance was not estimated quantitatively.

The second part of his paper dealt with the influence of pH and temperatures of 100 to 135C. on periodate oxycellulose. This treatment caused a change in the lignin and rendered it insoluble in the subsequent cook with acid calcium sulphite solution.

Diffusion and Penetration Mechanisms

Dr. A. J. Stamm, U.S. Forest Products Laboratory, discussed the complexity of the structure of wood. The capillary system, he said, is effectively noncontinuous and differs in the wood's three structural directions. All capillaries have large and small openings arranged in series, which makes it extremely difficult to force a liquid through a wood block.

Dr. Stamm then described his investigation on the rate of absorption at different temperatures. His results showed that the rate of absorption of liquid by wood varied directly as the vapor pressure of the liquid and swelling followed very closely behind absorption. His conclusion was that the entrance of water into a piece of wood is by a vapor phase absorption mechanism, and the chemical which brings about dissolution of lignin then enters the wood chip by diffusion.

Under vacuum conditions the rate of absorption, Dr. Stamm found, increases several hundred times that in air and is within 1 or 2 per cent of the calculated value based on the vapor phase absorption mechanism. Again, under vacuum conditions, swelling followed very closely behind absorption.

Variables in Sulphite Pulping

During a panel discussion on variables in sulphite pulping led by H. H. Sears, Price Bros. & Co. Ltd., Vance P. Edwards, consultant, stated that an increase of 10 degrees in temperature shortened the cooking time by about half. To achieve the same effect with a more concentrated acid solution the strength of the acid must be doubled.

Relief practice is necessary to recover the excess sulphur charged into the digester and to leave gas space for gas recovery, he said. Side relief fitting should be located high enough in the digester so that liquor cannot be drawn below the chip level, although an exception is made when it is desired to remove—under conditions of forced circulation—a larger volume of liquor in order to increase waste liquor concen-

PROPOSED METHODS of pulping other than those in common commercial use are described by panel members (l to r): A. J. Corey (moderator), Fraser Companies; J. H. Fisher, Ontario Paper; Dr. Wilfred Gallay, general chairman; K. C. Logan, Northeastern Paper Products, and C. J. Brounstein, McGill University student

tration. Side relief is usually started shortly after the penetration period—at about 115C.

Large temperature differences—up to 60C. have been reported—exist in any direct-heating quick cook digester, the speaker continued. Chip packing, actually developed for better chip distribution, will cause convection or forced circulation to rise at a uniform rate throughout the whole mass and will result in a more uniform temperature distribution.

Forced circulation also results in a more uniform temperature distribution especially in the packed digester. In summing up, Mr. Edwards stated that the combination "indirect heating, forced circulation, chip packing" as compared with "direct-unpacked" resulted in:

(*A*) appreciable increase in production for the same cooking time; (*B*) 35 per cent reduction in cooking steam; (*C*) reduction in tailings; (*D*) better pulp uniformity within the digester; (*E*) increase in color and strength; (*F*) 7 per cent increase in yield, and (*G*) increased waste liquor solids content.

Roughly speaking, about one-third of the cooking time should be devoted to gas recovery through pressure reduction. For example, for the last 2½ hours on an eight-hour cook the pressure is gradually reduced from cooking to about 25 to 30 pounds, but the temperature should not be allowed to fall during this period. Automatic time-temperature-pressure control is an important factor in obtaining maximum sulphur recovery, concluded Mr. Edwards.

J. S. Hart, Pulp & Paper Research Institute of Canada, reported results of an investigation on the effect of combined sulphur dioxide, free sulphur dioxide, and digester pressure. Excess combined sulphur dioxide produced a buffering on the pulping reaction, while no effect in pulp quality was noticeable due to increased quantities of free sulphur dioxide. Increasing the digester pressure increased the rate of reaction, but no effect on pulp quality due to increased pressure was observed under conditions where pulp samples were cooked to the same Roe number. These experiments were carried out with perfectly penetrated chips accomplished under a technique developed by the Institute but not yet made public.

Mr. Hart also briefly described the recently installed pH meter which measures pH values during a sulphite cook. The instrument, developed by Bristol, uses Beckman electrodes. It has been tested at temperatures as high as 135C. and pressures as high as 100 p. s. i.

High-yield Sulphite and Sulphate Pulping

The panel on high-yield sulphite and sulphate pulping consisted of J. S. Hart, Pulp & Paper Research Institute of Canada; C. V. Callaghan, Bathurst Power & Paper Co. Ltd.; L. R. Beath, Price Bros. & Co. Ltd.; O. J. Walker, Northeastern Paper Products, Ltd., and W. K. Voss, The Ontario Paper Co. Ltd.

W. K. Voss described briefly Ontario Paper's operation and equipment, which includes two Curlators, a Bauer refiner, and four digesters producing 210 tons sulphite per day. Primary screen and secondary screen rejects are returned to the curlators in parallel. Presteaming results in better penetration of chips and a reduction in knotter rejects. Presteaming also reduces maximum cooking temperature by 3 to 4C., resulting in higher yields. The outstanding problem with a throughput of 35 to 40 tons rejects per curlator is the elimination of frequent changes of tackle. Bronze plates give excellent throughput but wear out rapidly, while stellite plates are practically indestructible, but they show low throughput, said Mr. Voss.

L. R. Beath discussed his company's relatively low cooking temperature pulp process which shows a yield of accepted pulp of 63 per cent on the basis of chips. Daily output is 15 tons. The chips leaving the digester are still quite firm. Due to lower cooking temperature, it is impossible to recover as much sulphur, and sulphur consumption is therefore somewhat higher in this process.

A process yielding 60 to 62 per cent kraft pulp from mixed balsam, spruce and jack pine chips was discussed by C. V. Callaghan. The chips are steamed and moderately packed during filling. When filling is complete, steaming is continued until a pressure of 12 pounds is reached. Cooking is accomplished with 14.5 per cent alkali on basis of chips and at a pressure of 100 pounds. Tailings from the secondary screen are jordaned and returned to the primaries.

J. S. Hart briefly described the Dynapulper developed for the purpose of determining cohesiveness in pulp.

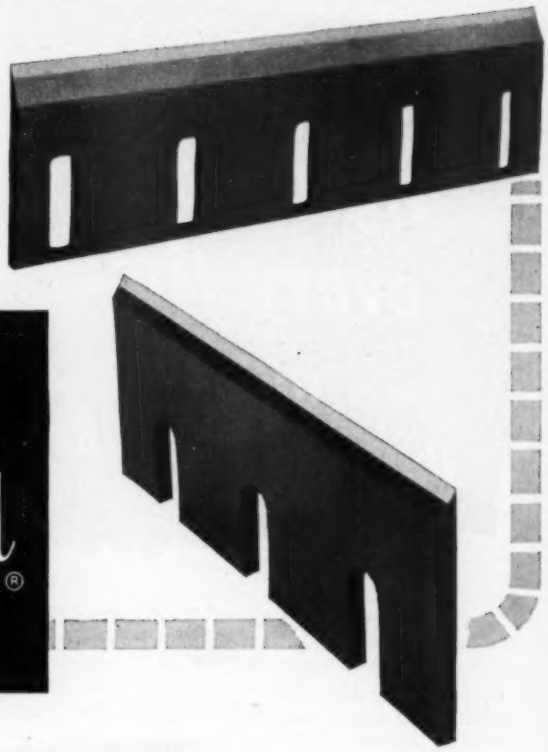
Continuous Pulping

Prof. W. J. Nolan, University of Florida, discussed the use of a hammer mill in continuous semichemical pulping, in an attempt to achieve maximum purification with minimum degradation of

CONTINUOUS COOKING of kraft pulp is discussed at the Murray Bay meeting by Johan Richter of Sweden

EXPERIMENTAL DEVELOPMENT of high-speed continuous alkaline pulping is the subject of Prof. W. J. Nolan

TAKE A TIP ON CHIPPER KNIVES



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the fibres. The chips are steamed for 10 minutes and then exposed to the action of a hammer mill for a very short time. The resulting fibres are long, and a tremendous reduction in the quantity of screenings was achieved. Presteaming of chips is essential. Fibres from non-steamed chips when hammer milled show considerable erosion and a high polish at the ends, while steamed chips produce fibres with no signs of erosion but considerable brooming at the ends. Prolonged hammer milling (to 10-16 mesh) results in considerable damage to fibre strength. Power consumption by a hammer mill is extremely low, since chips are kept in the mill for a very short time.

Johan Richter, Aktiebolaget Kamyr, Sweden, described continuous process equipment for the production of soft kraft pulp. These digesters have developed from their six-ton pilot-plant model developed in the period 1940 to 1948 to efficiently operating commercial units with daily outputs of 30 to 40 and 60 tons. Three units are in operation in France, two in Italy, and one in Switzerland. Two 60-ton units will go into production in Australia in 1953, while an 80-ton unit will start production in Japan in 1952. A 100-ton unit is being built for Finland and will be completed in 1954. The digester tanks in their present stage contain three distinct zones: (1) the upper zone is the penetration or impregnation zone, (2) then follows the heating zone, and (3) the bottom section constitutes the cooking zone. The time of passage through the 60-ton digesters is 2½ hours.

Other Methods of Pulping

A panel discussion led by J. H. Fisher, Ontario Paper Co. Ltd., dealt with methods of pulping other than those in common commercial use. Dr. Fisher reviewed the shortcomings of present methods and suggested that a new method to be satisfactory must operate with non-consuming chemicals, must show more efficient operation, and permit the utilization of lignin and hemicelluloses. The discussion was based on a comprehensive review of pulping methods made by C. J. Brounstein, a student at McGill University.

A. J. Corey described the familiar process in which chemicals are added at their rate of consumption, but which is more suitable for pulping straw and bagasse than wood.

K. C. Logan dealt with acid systems of pulping, the majority of which, he said, are rather costly. They are used to make special application pulps. The nitric acid process, Dr. Logan said, is probably the more promising one, because it produces an extremely pure pulp containing 98 to 99 per cent alpha cellulose. Dr. Stamm of the U.S. Forest Products Laboratory in this connection referred to a nitric acid plant now under construction in California at an estimated cost of under $1,000,000, compared with the cost of a conventional nitric acid plant of between $5,000,000 and $10,000,000. The new plant will use the so-called Daniels method for nitrogen fixation.

In conclusion, Dr. Fisher briefly described the near neutral salt processes, some of which are economical to operate, but there are still a lot of questions that have to be answered.

ENJOYING THE OUTING at the June 6 meeting of the Miami Valley Superintendents were (l to r): Glen Sutton, 1951-52 national president; Mrs. Sutton, and Frank B. Eilers of Orr Felt & Blanket Co.

Miami Valley Supts. Elect 1952-53 Officers

Bernard L. Merriss of Oxford-Miami Paper Co. was elected 1952-53 chairman of the Miami Valley Division, Superintendents Association, at a meeting June 6 at Piqua, Ohio. Host for the gathering was Orr Felt & Blanket Co. Presiding at the session was E. H. Bindley of Cheney Pulp & Paper Co., Franklin.

The remaining officers chosen at the meeting are: first vice chairman, George R. Lydick, Beckett Paper Co.; second vice chairman, Dean W. Newell, The Philip Carey Co., secretary-treasurer, James Ozias, Oxford-Miami Paper Co.

Speaker at the banquet was Glen Sutton of Sutherland Paper Co., Kalamazoo, Mich., 1951-52 national president of the Superintendents Association. The evening also featured golf prizes awarded for the afternoon play.

Instrumentation and Electrical Equipment

In a panel discussion led by C. A. Laverty, Anglo-Canadian Pulp & Paper Mills Ltd., the discussion centered around (1) armature burn-outs—their cause and prevention, (2) pros and cons of antifriction vers. sleeve bearings for rotating electrical machinery, and (3) difficulties caused by use of non-standard antifriction bearings.

To a different group T. P. Wall, Peacock Bros. Ltd., showed by way of slides the type and installation of instruments for the Bathurst BCM process. The instruments included 2-Pen Level Recorders on the liquor storage tanks, flow controllers for maintaining flow rate to the screw feeder, steam flow recorder to the chemipulper, screw feed and reaction chamber speed recorder, stock consistency controller, and a flow controller on the dilution liquor to the cyclone.

Another panel dealt with the subject of alkaline pulp mill corrosion which was introduced by C. Christianson, Pulp & Paper Research Institute of Canada. Corrosion data were discussed in the two-year program initiated by the Institute in April 1952 and financed by 15 Canadian kraft manufacturers. Other panels dealt with stock preparation equipment, factors relating to printing of paperboard, pitch in sulphite pulp and operation problems.

Sulphite Pulp Drying with Oliver Vacuum Cylinder

C. R. Tittemore, Gaspesia Sulphite Co. Ltd., showed how his company was effectively using the Oliver vacuum cylinder for pulp drying. The Oliver cylinder was selected, he said, because it had the hydraulic capacity required for their purpose and because it could be clad with stainless steel. The cylinder was operated at a speed of 175 feet per minute, giving a daily output of 275

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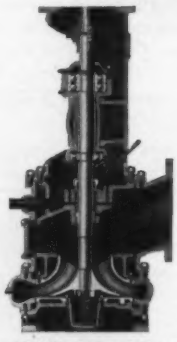

GOULDS Fig. 3115
Backwall ejector vanes on impeller prevent binding of stock behind the impeller . . . also give hydraulic thrust balance.

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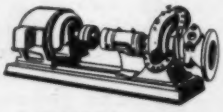
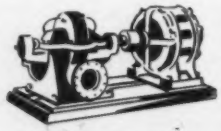


GOULDS Fig. 3105
Heavy duty, open impeller horizontal centrifugal pumps designed for handling paper stocks. Capacities up to 4000 G.P.M. Heads up to 220 ft. Send for Bulletin 723.1.

GOULDS Fig. 3705
Stainless steel pumps for handling acid and alkaline liquors. Capacities up to 600 G.P.M. Heads up to 160 ft.



GOULDS Fig. 3450
These double-suction, single-stage Goulds centrifugals will handle up to 15,000 G.P.M. Heads up to 500 ft. Ask for Bulletin 721.2.

MEMBER

Goulds PUMPS INC.
Seneca Falls
New York

tons. Considerable interest was aroused by a paper on self-sluicing blow pits presented by P. N. Bowle-Evans, Canadian International Paper Co.

Dorr Fluo-Solids Pyrite Reactor

Gordon Brown, Brown Corp., gave a description of the problems connected with the installation of the Dorr Fluo-Solids pyrite reactor and its operation. His estimate of the cost of production of the equivalent of a ton of sulphur was $12, compared with the cost of elemental sulphur of $25. The present output from the reactor is enough to meet 50 per cent of his company's sulphur requirements. Mr. Brown suggested that if another feed inlet were installed on the other side of the reactor, and a coarser particle-size pyritite used, his company's sulphur requirements might be completely met.

Centricleaner in Alkaline Pulping

Dr. G. H. Tomlinson and N. G. M. Tuck presented a theoretical discussion of the natural and forced turbulence created if a stream of liquid is forced tangentially into a centricleaner. These forces tend to drag the dirt and bark particles to the bottom where they are rejected through an outlet, while clean fibres leave the centricleaner at the top. The centricleaner was developed by Howard Smith Paper Co. The largest unit tried has a capacity of 4,000 gallons per minute. The centricleaner is now manufactured by Bauer Bros.

Chlorine Dioxide

An economical method of producing chlorine dioxide was described in a paper prepared by E. Kesting, Elektrochemische Werke, Muenchen, Germany. The author first described the Holst and the Persson-Angel processes of manufacturing chlorine dioxide. Elektrochemische Werke had modified the latter process by introducing an electrolytic unit which continuously oxidizes the sodium chloride produced in the reaction back to sodium chlorate. The supply of sodium chlorate therefore is never exhausted. The cost of producing chlorine dioxide by this method is about 60 per cent that of conventional methods.

300 Attend New England Supts.-Tappi Meeting

More than 300 members and guests registered at Toy Town Tavern, Winchendon, Mass., for the two-day joint meeting of the Connecticut Valley Division of the Superintendents Association and New England Tappi. The gathering was staged May 16-17.

At the opening luncheon four speakers addressed the group on various technical phases of the industry. Lewis Reid of Metropolitan Life Insurance Co.,

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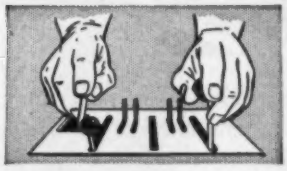
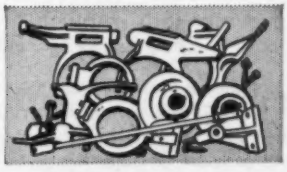
power hydraulic controls

STRIKING SAVINGS are created in pulpwood handling by the Speed-o-Matic controls of this K-360. Lost motion is eliminated. Up to 25% more work is done per day. Speed-o-Matic is a *power-driven* hydraulic system—no air or vacuum actuated devices. Hence no lag, no jump, no jerk.

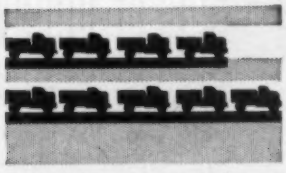
Here are LINK-BELT SPEEDER PLUS FEATURES that work for you



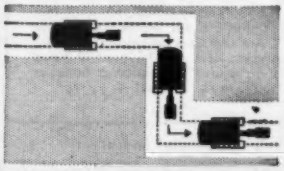
Speed-o-Matic Controls — fully hydraulic! You "feel" the load all the way. Simple, easy—fingers instead of muscles do work.



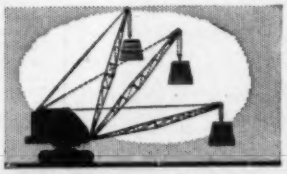
Eliminates up to 150 parts — cuts friction, no worn bushings, pins, links or clutch toggles to put you "down."



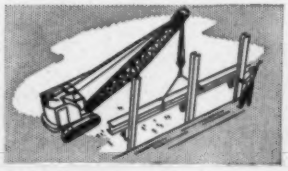
Up to 25% more production — fast operating cycle steps up output and profits. Effortless control keeps operator fatigue down.



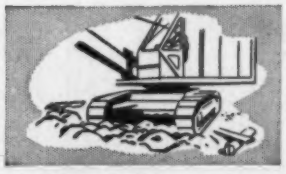
Turns on a Dime. Either track can drive or be locked independently. Hydraulic control gives instant response.



Independent Boom Hoist — controlled power *down* as well as up. *Safer*, faster. Boom, hoist, swing simultaneously or independently.



Pinpoint Accuracy — eliminates lost motion. Instant hydraulic response assures spotting heaviest loads—easily, precisely.



High Ground Clearance — eliminates snagging or fouling in rough areas. No projecting castings or easily damaged parts.

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Builders of the most complete line of shovels, cranes and draglines

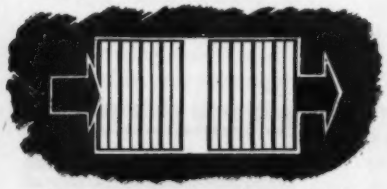
CEDAR RAPIDS, IOWA

These 10 BIG Features Make Western Precipitation COTTRELLS Outstanding in the Paper Industry

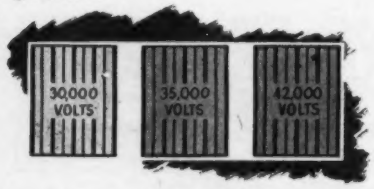
When considering COTTRELL Equipment for salt cake recovery, or any other application in the paper industry, remember this . . . *Western Precipitation Corporation not only pioneered the first commercial application of* COTTRELL *equipment made in any industry, but also pioneered the first application of* COTTRELL *equipment in the paper industry.*

Among the vitally important advantages found in Western Precipitation COTTRELLS, the following are particularly important in paper mill installations ...

1 **Sustained Year-After-Year Efficiency:** The recovery efficiency of Western Precipitation COTTRELLS does not fall off in service. All parts are of ample design to maintain guaranteed over-all efficiency year-after-year —not for just a single acceptance run.



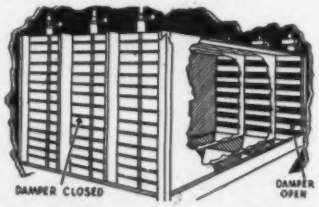
2 **Higher Recovery:** The horizontal flow design of Western Precipitation COTTRELLS eliminates collected material falling countercurrent to incoming gas stream This assures higher recovery, minimum resuspension of recovered material in gas stream.



3 **Maximum Performance:** Horizontal flow of Western Precipitation COTTRELLS permits use of multiple electrical sections so that voltage in each section can be varied to dust loading for maximum recovery without arc-over or electrical breakdowns.

4 **Lower Over-all Cost:** When comparing COTTRELL costs, be sure to compare total *installed* cost, including duct work.

5 **Simpler Maintenance:** Because all interior parts and electrode systems are readily accessible, Western Precipitation COTTRELLS are far easier to maintain and service. Saves "down" time, saves repair costs.



6 **Greater Adaptability:** Horizontal flow design permits use of multi-vane dampers in multiple-unit installations. Thus, one unit can be shut off completely to permit maintenance operations without closing down entire Precipitator. Also, the dampers can be used in slightly-closed position to assure more uniform gas distribution.
On single-unit installations, chain curtains assure uniform distribution of gases. Curtains are easily kept clean by shaker mechanisms provided.

7 **"V"-Shaped Hoppers:** Horizontal design permits use of continuous "V"-shaped hoppers for collecting recovered material. Steeply-sloped walls in this type of hopper prevent build-up or bridging of recovered material.

8 **Space-Saving Compactness:** Not only do their horizontal design permit maximum compactness in Western Precipitation COTTRELLS, but various sections of a unit can be arranged for indoor installation in space above cascade evaporators, thus utilizing space otherwise wasted.

9 **All-Weather Construction:** Western Precipitation COTTRELLS are built for both indoor or outdoor installation, and this organization has had extensive experience with special construction to prevent excessive corrosion in rigorous northern climates.

10 **More Extensive Experience:** Since pioneering the commercial application of COTTRELL Precipitators over 42 years ago, Western Precipitation has consistently led in developing one unique advancement after another. Such features as 4-Point Electrode Suspension that eliminates misalignment of electrodes and reduction in recovery efficiencies . . . Unusually Rugged Rapper Design that assures proper cleaning of electrodes . . Extensive Experience with all types of electrode designs . and many other advantages assure you the ultimate in COTTRELL design and efficiency when you bring your recovery problems to Western Precipitation engineers.

Without obligation our nearest representative will gladly make Western Precipitation COTTRELL *experience available to you for solving your particular recovery problem. Why not contact him today?*

IMPORTANT! In addition to COTTRELL *Electrical* Recovery equipment, Western Precipitation Corporation also designs and installs the well-known MULTICLONE *Mechanical* Collectors for hogged-fuel fired boilers. These units are unusually compact, highly efficient and can be readily fitted into existing plants at minimum installation costs. *Write for details!*

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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

New York, N.Y., spoke on the subject of permanent papers. He stressed the importance of permanency in the paper that his company selects for its various records. He commented that 100 per cent rag paper is best for their purpose, but that due to high costs there has been a down grade from a set policy of 100 per cent rag to 75 and even 50 per cent rag.

Business papers was the subject of Harry O. George, Laboratory Division of International Business Machines Co., Endicott, N.Y. In his talk he listed various specifications to which paper made for his firm for use as paper tape must conform. Among the data were information on basic weight, thickness, strength, durability, and moisture content.

Electrical papers were discussed by Philip L. Stoats, head of the paper laboratory for General Electric Co., Pittsfield, Mass. He said that one of the largest problems of his company concerns paper and paper products for electrical insulation. Touching briefly on specifications, he commented on some of the objectionable items in papers used in his field.

Specifications likewise came in for consideration by Charles Woodcock, Central Research Laboratories, General Foods Inc., Hoboken, N.J. These specifications covered such papers as required to meet the needs of his industry. A question and answer period followed the four talks. Chairman of the session was Dr. Harold W. Knudson, Hollingsworth & Vose Co., chairman of the New England Section of Tappi.

Dinner in the evening was followed by a talk by John L. Calkin, head of the Pulp and Paper Foundation at the University of Maine. He stressed the necessity for industry to aid in training students for technical positions in pulp and paper mills.

Albert E. Bachmann, vice president of Missisquoi Corp., Sheldon Springs, Vt., was featured during the program that opened the second day's session. His subject was "The Practical Man and the Technical Man."

Helen U. Kiely was responsible for the program; J. D. Retallick and P. Applegate for publicity; C. I. Horton for finance; A. Montagna for arrangements, and C. C. Decker for golf.

Pacific Coast CPPA Technical Section Elects 1952-53 Officers

The 1952-53 officers of the Technical Section of the Pacific Coast branch of CPPA were recently elected at the annual spring meeting, which was held at Harrison Hot Springs, B.C. New chairman is M. F. Smith, Sidney Roofing & Paper Co., Victoria; first vice chairman, Dr. R. Patterson, Powell River Co., and

10
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are simple
One moving part. No valves, no pistons, no sliding vanes, no internal lubrication. This makes possible important operating advantages no other type pump offers.
Plus—
NASH ENGINEERING COMPANY
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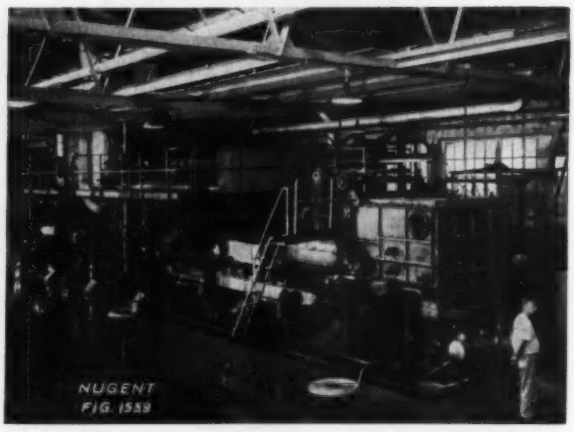
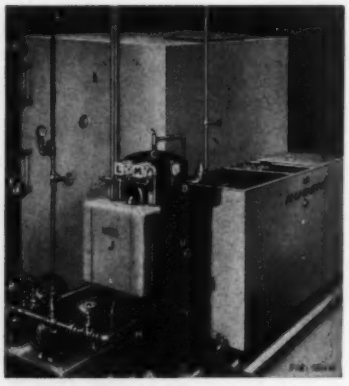
MAINTENANCE DOWN . . . SAVINGS UP . . .



When you use NUGENT GRAVITY OIL FILTERS *for paper machinery*

Nugent Gravity Oil Filters are the economical method of filtering the oil used for lubricating paper machinery. Experience shows that average oil savings are in excess of 95%. And by assuring a continuous supply of CLEAN oil, maintenance is reduced and equipment life extended substantially. For protection against corrosion, Nugent Filters neutralize acidity and maintain a safe value. For economy's sake you can't afford to be without a Nugent Oil Filter.



Nugent Gravity Oil Filters may be operated continuously since each of the multiple filtering units can be removed independently for cleaning. And for further convenience an alarm is given automatically when cleaning is necessary. Write for full details today.

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secretary-treasurer, M. F. Oke, Vancouver Paper Box Co.

H. S. Foley, president of Powell River and current chairman of the CPPA Western Division, spoke to the 160 delegates gathered at the conference. He emphasized the fact that the Pacific Coast pulp and paper industry had provided much of the stimulus in the trend toward complete utilization of wood.

Coming Events

TAPPI meetings

Sept. 25-27—Pacific Coast Section (joint meeting with the Pacific Coast Division, Superintendents Association, and the Pacific Coast branch Technical Section of the CPPA), Empress Hotel, Victoria, B.C.

Nov. 12-14—Sixth Annual Alkaline Pulping Conference, Mobile, Ala.

Nov. 20-21—Corrugated Combiner Conference, Hotel Schroeder, Milwaukee.

American Pulp & Paper Mill Superintendents Association meetings

Sept. 18-21—Northeastern Division, Poland Spring House, Poland Spring, Maine.

Sept. 25-27—Pacific Coast Division (joint meeting with the Pacific Coast Section of Tappi and the Pacific Coast branch Technical Section of the CPPA), Empress Hotel, Victoria, B.C.

Sept. 26-27—Pennsylvania-New Jersey-Delaware Division (fall meeting), Galen Hall Hotel, Wernersville, Berks County, Pa.

Oct. 8-10—Southern and Southeastern Divisions (joint meeting), Hotel Roanoke, Roanoke, Va.

Oct. 11—Connecticut Valley Division (fall meeting), Berkshire Inn, Great Barrington, Mass.

Other meetings

Aug. 12-14—Fourth Western Packaging and Materials Handling Exposition, Shrine Convention Hall, Los Angeles.

Sept. 8-12—Instrument Society of America, National Instrument Conference and Exhibit, Cleveland.

Sept. 9-13—Seventh National Chemical Exposition, Coliseum, Chicago.

Oct. 13-16—Printing Industry of America, Chase Hotel, St. Louis.

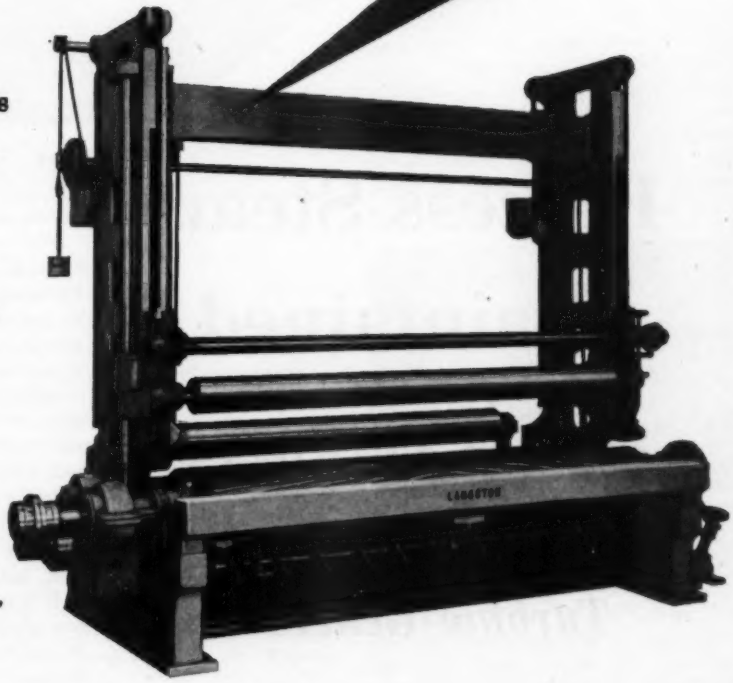
Nov. 5-7—Industrial Management Society, Sixteenth Annual Time and Motion Study and Management Clinic, Sheraton Hotel, Chicago.

Dec. 1-6—Twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, N.Y.

Dec. 7-10—American Institute of Chemical Engineers, annual meeting, Cleveland Hotel, Cleveland.

top quality rolls

Your customers' most exacting specifications can be met with rolls produced on a *Langston*. Firm from core to finished diameter; clean-cut and square-edged—truly *top quality rolls*. Bulletin #204 contains complete details—ask for a copy.



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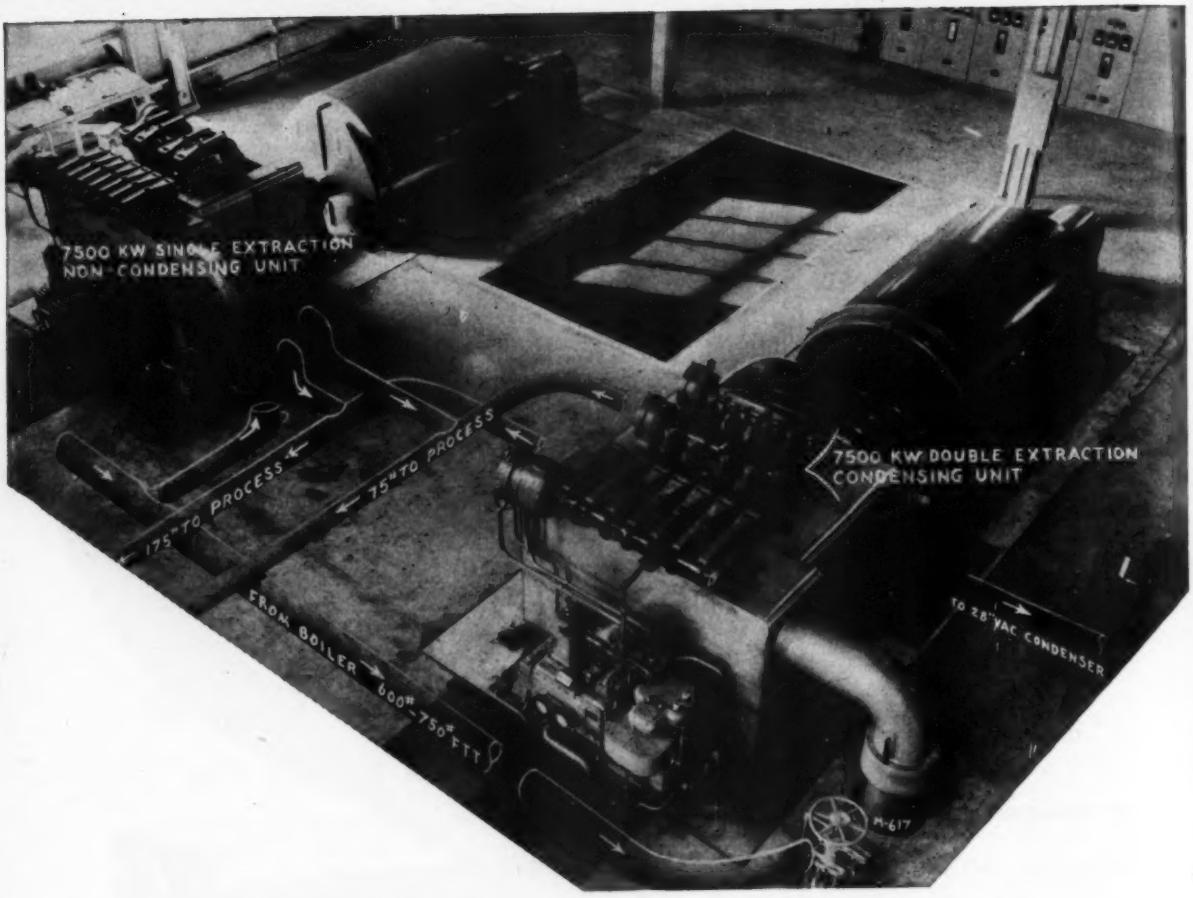
CAMDEN, N. J.



Process Steam Maintained at 2 Pressures

by Worthington Turbine Generators

This is how Worthington and a Far West cellulose mill set up the steam supply for utmost efficiency and flexibility.

We combined a non-condensing single automatic extraction unit with a condensing double automatic extraction unit. The 7500-kw units operate in parallel and, in addition to supplying plant power, furnish steam at two pressures for process requirements.

Along with the advantages of efficient operation and low cost and ability to adjust to mill requirements, this mill benefits from the manufacturer's *unit responsibility*. In this case, Worthington also furnished two 470-hp turbines to drive boiler feed pumps, two 452-hp turbines to drive induced-draft fans, two 146-hp turbines to drive forced-draft fans, and one 50-kw turbine-driven exciter set.

If you want proof *there's more worth in Worthington*, write Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Steam Turbine Division, Wellsville, New York.

T.2.6

A GREAT TEAM IN STEAM

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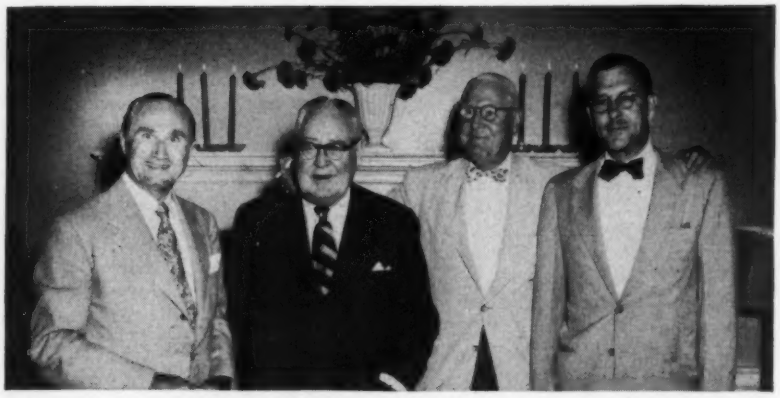
Steam Turbine Generators

The Paper Industry Names in the News



HONORED FOR OUTSTANDING LEADERSHIP AND SERVICE in the folding and paperboard industry at a special dinner held recently at Dayton by the Ohio Valley Group of the Folding Paper Box Association of America were the Gardner brothers: (center) Robert B., executive vice president; Colin, senior vice president, and Edward T., president, (not in the picture) of Gardner Board & Carton Co., Middletown, Ohio. They are pictured with C. C. Vatter, chairman of the valley group, and Henry Bond, vice president of Richardson Taylor-Globe Corp., Cincinnati

Smith Named Director of OPS Forest Products Division

M. W. SMITH JR., who has been serving as assistant director of the Forest Products Division, Office of Price Stabilization, has been named division director. He replaces *RUFUS I. WORRELL*, who has returned to The Mead Sales Co. Inc., Dayton, Ohio, where he is chairman of the board.

Mr. Smith came to OPS as a consultant to the Forest Products Division in August 1951 and in October 1951 was appointed assistant director. He is president of M. W. Smith Lumber Co. and White Smith Lumber Co., Jackson, Ala.

The assistant division director will be *M. C. WALSH*, former chief of the Pulp, Paper and Paperboard Branch. He has been with OPS since March 1951. Previously, he was manager of the Trade Research Department of Champion Paper & Fibre Co., Hamilton, Ohio.

ANDREW M. McBURNEY has been named chief of the Pulp, Paper and Paperboard Branch, to succeed Mr. Walsh. He joined OPS last December and served as a consultant to the Fine Paper Section. He formerly was sales manager of Oxford Paper Co. *C. E. CARPENTER* will be assistant chief of the Pulp, Paper and Paperboard Branch. He previously was chief of the Paperboard and Converted Paperboard Products Section. He came to OPS in December 1951 from Oco Water Systems Inc., of which he was president.

Ontario-Minnesota Woods Changes

Three promotions in the woods department of Ontario-Minnesota Pulp & Paper Co. Ltd. have been announced by J. F. McKellar, vice president and general manager.

GEORGE A. POTTS, woods manager at Fort Frances, has been named woods production manager for O-M's logging operations. *C. W. ROARK*, assistant woods manager at Kenora since 1950, is now general woods superintendent in the Kenora Division. *S. N. GOLDER*, logging superintendent in the Lake of the Woods area, has been made general woods superintendent in the Fort Frances Division.

Hammermill Change Announced

ROBERT S. YOUNG, currently superintendent of the finishing division, was to become assistant manufacturing superintendent for Hammermill Paper Co., Erie, Pa., July 1. A veteran of 33 years with the firm, he began his career in the finishing division.

Replacing Mr. Young as superintendent of finishing is *ADRIAN KENNEDY*, until his promotion assistant superintendent. Like Mr. Young, he is a Hammermill veteran, having started at the mill in 1929 as a packing clerk in finishing.

Faegre New Chairman of Mando Executive Research Committee

ROBERT FAEGRE, vice president of Minnesota & Ontario Paper Co., has been appointed chairman of the firm's Executive Research Committee, which formulates over-all policy and considers and approves all research projects. The president, J. B. Faegre, Sr., will continue as an ex officio member of the committee.

Mr. Faegre has been with the company since 1938, when he served as a special representative for the Insulite Company in Denmark. He later served as assistant sales manager, first in the Insulite division and later in the Paper Sales division. He has been Paper Sales Manager since 1949 and was elected vice president of Mando in June 1951.

Lyle F. Watts

R. E. McArdle

Watts Retires as U.S.F.S. Chief Forester

LYLE F. WATTS, chief forester for the past nine years, was to retire from the U.S. Forest Service on June 30. According to Secretary of Agriculture Charles F. Brannan, Mr. Watts is to be succeeded by *RICHARD E. McARDLE*, since 1944 assistant chief in charge of cooperative forestry programs.

Starting as a fire guard in a western national forest in 1913, Mr. Watts worked his way up through the ranks to the nation's top forestry position. He was in research work for several years, including five years as director of a

forest experiment station. He was the organizer and first head of the School of Forestry at Utah State Agricultural College. From 1936 to 1939 he served as regional forester of the North Central Region. Mr. Watts then became regional forester of the Pacific Northwest Region.

A career government forester, Mr. McArdle has been a member of the Forest Service for more than 25 years. At one time he was director of a regional forest experiment station, where he conducted important research work on fire control and on timber growth and yield. His first assignment in the service was at the Pacific Northwest Forest and Range Experiment Station. During a year's absence from the U.S.F.S. in 1934-35, Mr. McArdle served as dean of the School of Forestry, University of Idaho.

H. E. Teter

O. B. Mason

Divisional Changes Reported by Mead

HOWARD E. TETER, manager of Mead Corp.'s Chillicothe, Ohio, Division since 1930, has been named to the newly created post of production manager for white paper operations. In his new position he will serve as assistant to George H. Pringle, vice president in charge.

O. B. MASON, assistant to the vice president, succeeds Mr. Teter as Chillicothe Division manager. Assisting him will be *JOHN E. GRAVES,* assistant general superintendent, who takes over the new post of production manager of the division. *R. C. BRADBURY* and *GEORGE H. SHEETS* will be assistants to the division manager. Mr. Sheets has been on the staff of the executive vice president, while Mr. Bradbury continues in his present assignment.

HOYT H. WHEELAND, superintendent of No. 2 Paper Mill, and *E. R. BRUNDIGE,* chief inspector, each assume the responsibilities of assistant production manager. The former is succeeded by *MASON HINKLE,* who is promoted from assistant superintendent to superintendent of No. 2 Mill. *ROGER BALL,* assistant to the division manager, becomes Mr. Hinkle's assistant. *LLOYD E. BROWN,* first assistant inspector, replaces Mr. Brundige as chief inspector, while *ROBERT F. BEYERLY* is promoted to first assistant inspector.

G. R. WILLIAMS, now superintendent of No. 1 Paper Mill, is to assume the superintendency of No. 3 Mill. *E. C. HENDRICKSON* will be superintendent of No. 1 Mill, moving up from assistant superintendent. He is succeeded by *DONALD COLLINS,* assistant to the division manager.

In another divisional change, *FREDERICK D. THAYER JR.* has been named assistant manager of the Tannin Extract Division of Mead Corp., with headquarters at Lynchburg, Va. He has been working at the Stamford Research Laboratories of American Cyanamid Co. since 1938 and from 1946 has been group leader of the Leather Chemicals Laboratory in the Technical Service and Development Division.

Helen Kiely Resigns AWP Research Post

MISS HELEN U. KIELY has resigned as research director and chief chemist of American Writing Paper Corp., Holyoke, Mass., after 30 years' service. She will continue to serve the firm as a consultant. E. C. Reid, AWP president, has announced that no successor has been appointed as yet.

A graduate of Smith College, Miss Kiely has been associated with such paper industry developments as the increased use of raw cotton and plastics, wet strength resin, and wartime papers. She has devoted much time to the development of new uses for paper and new types of paper. Miss Kiely was the first woman to be admitted to Tappi and is currently on the executive committee of the New England Section. She is also a member of the research group of APPA.

Helen U. Kiely

Dr. M. L. Prebble

de Gryse, Canadian Forest Aide, Retires

J. J. de GRYSE, chief of the Division of Forest Biology in the Science Service of the Canadian Department of Agriculture, has retired after 29 years' service. He is to be succeeded in the post by *DR. MALCOLM L. PREBBLE,* formerly officer-in-charge at the forest biology laboratories in Sault Ste. Marie, Ont.

A graduate of Louvain University in Belgium and at one time on the staff of the Bureau of Entomology of the U.S. Department of Agriculture, Mr. de Gryse joined the Canadian department in 1923 as an assistant entomologist at the laboratory in Indian Head, Sask. In 1936 he was made chief of the Division of Forest Insects and in 1951 was named chief of forest biology. He is a fellow of the Royal Society of Canada.

Dr. Prebble, a native of New Brunswick, joined the Department of Agriculture at the Forest Insect Laboratory in Fredericton in 1928. A graduate of the University of New Brunswick and of McGill University, he was appointed to the Sault Ste. Marie post in 1945.

FRANKLYN O. WARE, at one time technical director of Kalamazoo Paper Co., has been appointed to the Chicago office of the Paper Sales Division of Brown Co. Prior to his present appointment, Mr. Ware was assistant industrial sales manager for Glidden Co.

F. O. Ware

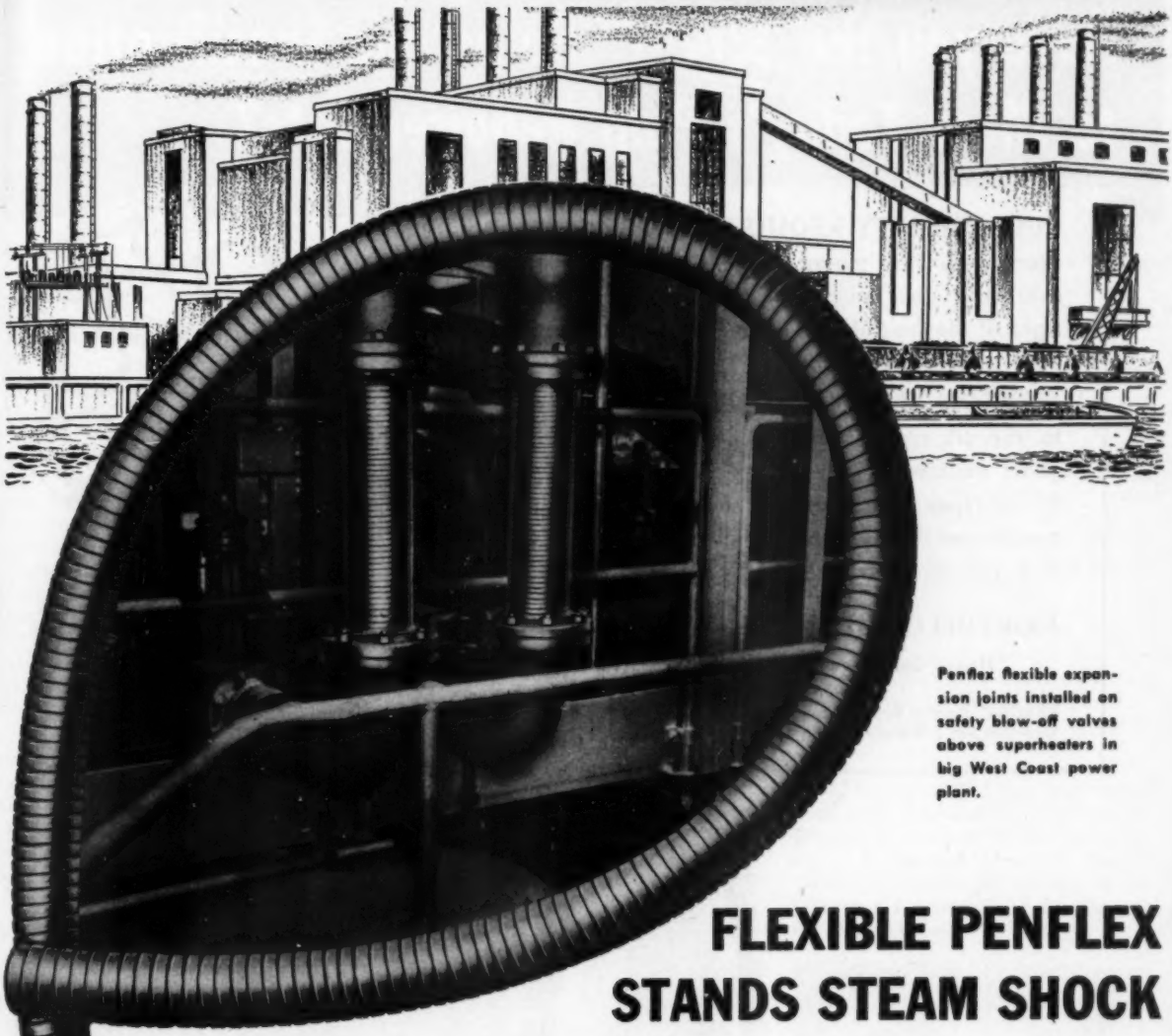
F. H. Singletary

F. H. ("Curly") SINGLETARY, formerly assistant superintendent in the Palatka, Fla., mill of Hudson Pulp & Paper Corp., has been named superintendent of the paper mill as Calcasieu Paper Co., Elizabeth, La. Mr. Singletary is a brother of Gordon K. Singletary of Brunswick Pulp & Paper Co., who was recently elected national president of the Superintendents Association. "Curly" began his career in the paper industry in 1929 at Elizabeth. He has also been associated with Crossett Paper Mills, Crossett, Ark., and St. Marys Kraft Corp., St. Marys, Ga.

W. H. GRAEBNER, Neenah, Wis., has been made chief mill manager for Marathon Corp. As regional plants production manager, he has supervised operations at Oswego, N.Y., Sunnyside, Wash., and Menominee, Mich. In his new post Mr. Graebner will also be in charge of production at Ashland, Rothschild and Wausau, Wis. He has been with the firm since June 1927.

GEORGE A. WHITING, of Neenah, Wis., has been elected president and treasurer of George A. Whiting Paper Co., Menasha, Wis. He succeeds his father, the late George B. Whiting.

HERBERT H. WYMORE has been appointed successor to *GEORGE H. GALLAWAY* as resident manager of the National Paper Products Division of Crown Zellerbach Corp. in Carthage,



Penflex flexible expansion joints installed on safety blow-off valves above superheaters in big West Coast power plant.

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Without warning, the safety valves atop these big superheaters suddenly pop. A mighty surge of 900 F, eight-hundred-and-fifty-pound steam blasts through the pipes to exhaust to atmosphere. These pipes have to know how to take it!

Ordinary rigid pipe would blow apart under the terrific thermal expansion. But Penflex flexible metal tubing has enough "give" to take the shock. Six lengths of 8" Penflex interlocked tubing installed as expansion joints on the boiler blow-off line cushion the sudden impact . . . take up any pipe movement due to extreme temperature and pressure changes.

Penflex engineers can help you solve your tough tubing problems. Penflex makes a complete line of 4-wall interlocked and seamless welded corrugated tubing . . . metallic hose, tubing and couplings from ⅛" I.D. up . . . automatic barrel fillers, pneumatic rivet passers, accessories and fittings. Write for illustrated folder "Flexineering." It's a valuable production aid.

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Have you the *Right* Pulpstone Specification to Meet Today's Pulp Requirements?

PULP QUALITY REQUIREMENTS are changing every day. That means that it's more essential than ever that your pulpstone specifications be *exactly* right. If they're "off the beam" on even one variable, pulp quality can suffer.

NORTON TECHNICAL SERVICE can be of help to you. It's real service, too — based on over twenty years' experience in designing and building pulpstones for all types of groundwood mills. It's service that can specify just the right stone to give you the pulp quality that you want to meet today's requirements.

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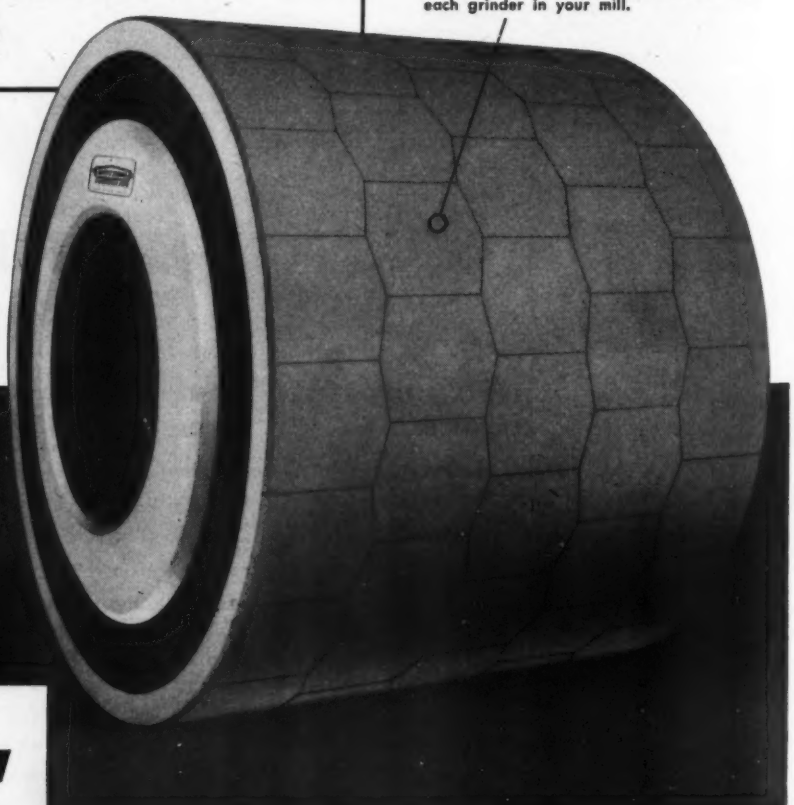
THE NORTON PULPSTONE ENGINEER will study your conditions and specify a stone that's right in abrasive (ALUNDUM, 38 ALUNDUM, CRYSTOLON), bond, grit size, grit spacing and stone hardness to produce the desired quality of pulp from each grinder in your mill.



NORTON PULPSTONES

Making better products to make other products better

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N.Y. He formerly was resident manager at the Lebanon, Ore., division. Mr. Gallaway has been transferred to Camas, Wash., where he will be assistant resident manager. He has been resident manager of the Carthage division since 1950.

WILLIAM A. RITCHIE, for the past eight years superintendent of Marathon Corp.'s converting plant at Menominee, Mich., has been made plant superintendent at Menasha, Wis. With the firm since 1928, he will supervise the waxing, interfolding, bag making, and shipping departments.

Dr. Zentner Receives Westbrook Steele Gold Medal

DR. THOMAS G. ZENTNER, recently graduated from The Institute of Paper Chemistry with the Ph.D. degree, has been selected from the 1952 class to receive the Westbrook Steele gold medal for his thesis, "A Study of the Reaction Products of Lignin Model Compounds and Sodium Hydrosulphide."

The award, established in 1941 by the president of The Institute, Westbrook Steele, is presented each year by vote of the faculty to the graduate whose doctoral thesis is most outstanding.

Dr. Zentner, who is from San Angelo, Tex., received the B.S. degree in chemical engineering from Texas A. and M. in 1948 and the M.S. degree from Lawrence College in 1950. He recently accepted a position with Gardner Board & Carton Co., Middletown, Ohio.

Dr. Thomas Zentner

C. M. Connor

W. C. Hamilton Elects

The board of directors of W. C. Hamilton & Sons, Miquon, Pa., recently re-elected *H. H. HANSON* as president. Other officers chosen at the meeting are *LANE TAYLOR,* executive vice president and treasurer; *J. H. DUNTON,* vice president in charge of sales; *E. W. JONES,* controller, and *CHARLES GIDLEY,* assistant treasurer. A new vice president elected was *C. M. CONNOR.*

Mr. Connor, a graduate of Syracuse University, was at one time technical director of Glassine Paper Co. In 1944 he was named vice president and general manager of the firm. During World War II he served as a member of the Pulp and Paper Technical Advisory Committee of the War Production Board. In 1948 Mr. Connor was appointed director of research and development for Ohio Boxboard Co. He joined the staff of W. C. Hamilton & Sons in 1949 and has since served as technical director.

COLA G. PARKER, president of Kimberly-Clark Corp., Neenah, Wis., has been awarded a citation of merit at a recent University of Chicago alumni assembly. He was cited for civic and community work in Neenah-Menasha.

CHARLES MELICHAR, Washington, D.C., has taken over as chief of operations for the North Central Region of the United States Forest Service. His headquarters are in Milwaukee. Mr. Melichar succeeds Donald R. Ball., who has been transferred to the California Region.

LUCIEN G. ROLLAND has been appointed vice president and general manager of Rolland Paper Co. Ltd., Montreal. Formerly assistant general manager, he succeeds his father, Olivier Rolland, who has retired as one of the firm's vice presidents but remains active as a member of the board of directors.

J. A. LeVAN has been appointed a representative for Bauer Bros. Co., Springfield, Ohio. His territory embraces southern Georgia, Alabama, Mississippi, Arkansas, Louisiana, and Texas. Mr. LeVan is sales engineer for the complete Bauer line of pulp, feed, food and nut processing machinery.

J. A. LeVan

R. T. Hanger

Robert Gair Co., Inc., has appointed *ROLAND THOMAS HANGER* assistant division manager of their Bogota Container Division. Mr. Hanger formerly was vice president and general manager of Chatham (N.J.) Container Co.

PHILIP E. ANDERSON has been made representative for F. C. Huyck & Sons in the states of Wisconsin, Minnesota, and upper Michigan. He succeeds Byron A. Yule, who is retiring after 21 years' service.

SCHAEFFER E. SPECHT has been appointed executive sales engineer for Research Corp. He will make his headquarters in Bound Brook, N.J. Mr. Specht was formerly plant engineer for C. K. Williams & Co., Easton, Pa., and design engineer for Penn-Dixie Cement Corp., Nazareth, Pa.

Link-Belt Co. has appointed *JAMES H. OAKES,* former sales manager for enclosed drives, sales manager for the Philadelphia plant, and *BYRON K. HARTMAN,* former assistant sales manager at Philadelphia, sales manager for the new Colmar plant, which will begin manufacturing operations later this year in Colmar, Pa.

J. DELANO HITCH, formerly vice president in charge of sales, has been promoted to the position of executive vice president of Dorr Co., Stamford, Conn. *T. BARTOW FORD,* until recently manager of international sales, has succeeded Mr. Hitch as vice president for sales. *JOHN H. E. FEDELER,* an assistant manager of international sales, has succeeded Mr. Ford.

HUGH T. HOLLAND of Bangor, Maine, has been appointed a sales engineer for Monsanto Chemical Co.'s Merrimac Division. Formerly with International Paper Co., he is a member of Tappi.

ALFRED J. FAVA has been named sales director of the General Products Division of American Machine & Foundry Co. At the same time, *J. J. CRANMORE* was made sales manager of the Lowerator Department of the General Products Division.

A. J. Fava

A. L. Jones

A. L. JONES has been appointed manager of the Water Treating Division of Worthington Corp. (formerly Worthington Pump & Machinery Corp.), Harrison, N.J. Formerly manager of the sale of water treating and deaerator equipment in the Steam Power Division, he will now be in charge of sales, engineering, production, and service.

EARLE D. BENSON has been appointed field engineering manager of the Industrial Equipment Division of Tracerlab, Inc. For the past 12 years he has been with the commercial engineering department of Sylvania Electric Products, Inc.

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The Paper Industry Necrology

Ellwood Wilson

Founder of the Woodlands Section of the Canadian Pulp & Paper Association and one of Canada's outstanding consulting forestry engineers, *Ellwood Wilson* died May 24. He was 81. A resident of Montreal, he was past president and director of the Canadian Forestry Association. He was active professionally until shortly before his death.

William J. Wardell

A vice president and director of American Can Co., *William J. Wardell,* 64, died recently in New York, N.Y., after a long illness. He had been associated with the firm since 1903, two years after the company was formed.

Beginning his career with the company as a packing ticket writer, Mr. Wardell later held several important positions in both manufacturing and sales and was instrumental in effecting a number of manufacturing economies and methods of pricing. During both world wars, he played an important role in supervising the production of military material.

Louvian G. Simons

Associated with Chas. T. Main Inc., Boston, Mass., since 1945, as a paper mill engineer, *Louvian G. Simons* died on June 10.

Mr. Simons was graduated from the University of Chicago in 1930 and received the degree of Master of Science in Chemical Engineering from Massachusetts Institute of Technology in 1932. He was a member of TAPPI and a registered professional engineer in the state of New York.

Dr. James Edward Bellinger, 59, of Collinsville, Ill., medical director of Alton Box Board Co., Alton, Ill., since 1945, died June 17 in Clayton, Mo.

Christopher W. Power, 67, foreman at West Dudley Paper Mill Co., Southbridge, Mass., died recently following a heart attack.

C. P. Robinson, 68, sales representative for Kidder Press Co., Hanchett Manufacturing Co., and American Shear Knife Co., died June 12 at Mechanicville, N.Y. He was formerly production manager of pulp and paper for Cherry River Paper Co. for ten years, sales manager of Borregaard Co., Inc., for sixteen years; and, for the past fourteen years, was manufacturing representative and industrial consultant throughout the United States and Canada.

Herman C. Orchard, 61, president and founder of Orchard Paper Co., St. Louis, Mo., died of a heart attack at a St. Louis hospital on June 21. In 1912 he helped form the old Brown Paper Co., and in 1920 he formed the Orchard Paper Co.

Philip J. Galmbacher, 56, general manager of Great Lakes Paper Stock Co. for the past five years, died June 19.

President and founder of Marquardt & Co. of New York, a wholesale paper firm, *Oswald Frederick Marquardt,* 68, died June 5 following a short illness. He was born in Germany and founded the paper company 26 years ago. Mr. Marquardt was a former president of the National Paper Trade Association, and a member of the Paper Association, the Paper Club, and the Advertising Club, all of New York.

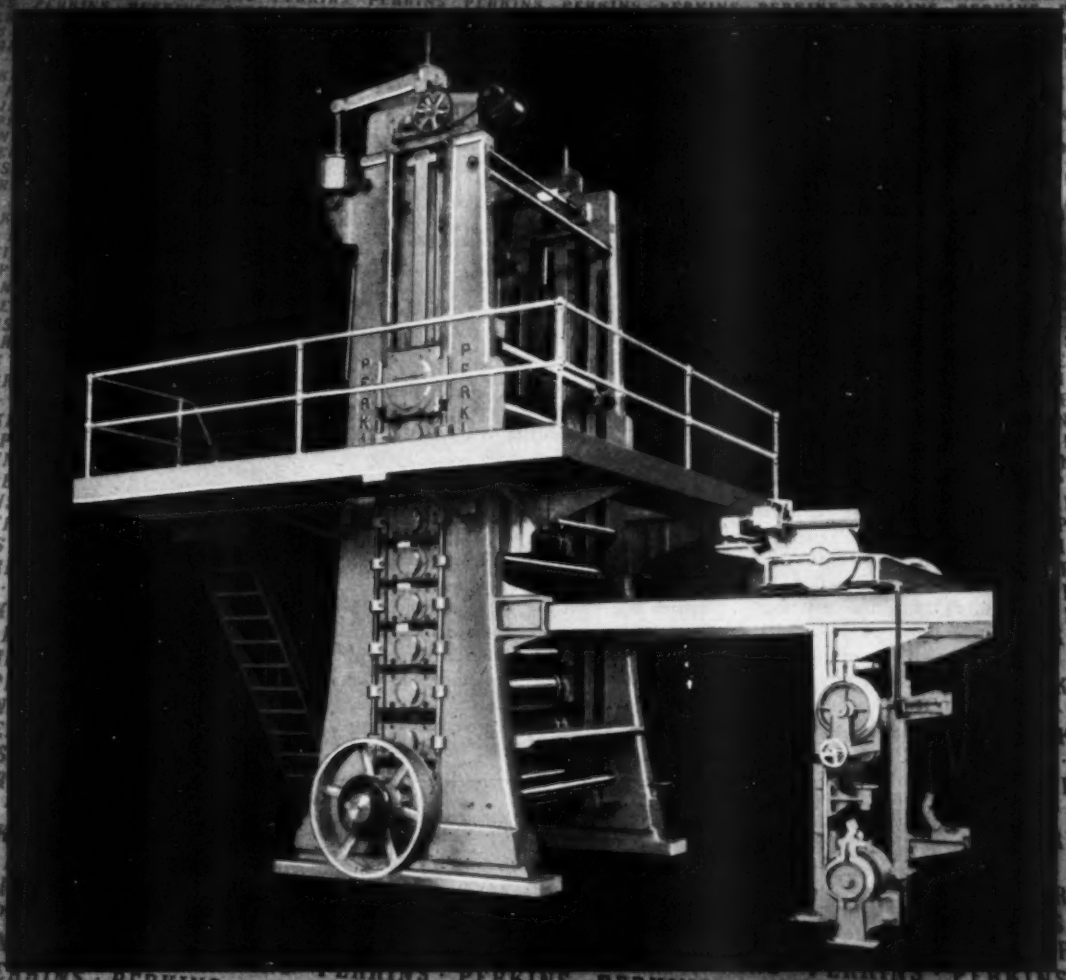
Thomas J. Dee, 90, of Evanston, Ill., died June 18 at his home. He was board chairman of National Foil Co., Elizabeth, N.J., and vice president of Hoberg Paper Mills Inc. He also was founder of Thomas J. Dee & Co., manufacturers of precious metal products, which later was merged with Handy & Harmon.

William H. Donaldson Sr., 73, retired treasurer and director of Perkins-Goodwin Co., New York, N. Y., paper and pulp dealers, died May 22.

Howard C. Thompson, 55, for many years traffic manager of Strathmore Paper Co., West Springfield, Mass., died May 20.

Bert H. Liethen, 59, pulp mill superintendent of Combined Locks Paper Co., Combined Locks, Wis., died at Rochester, Minn., May 26 following a long illness.

North Emory Bartlett, former vice president in charge of sales for Pennsylvania Salt Mfg. Co., died June 7 at his home at Teal Point, Md. He was 82.



TEN TO FOURTEEN

Perkins ten-roll 64" face Web Supercalender with provision for fourteen (14) rolls.

- All rolls in Timken anti-friction bearings
- Stationary reel with electric hoist
- Lever pressure with pneumatic loading
- Fly rolls mounted in self-aligning anti-friction bearings
- Motor driven hoist for raising and lowering rolls

B. F. PERKINS & SON, Inc.

HOLYOKE, MASS., U.S.A.

LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD

The Paper Industry Safety News

Pulp and Paper 1951 Safety Rates Drop

According to figures recently released by the National Safety Council, the pulp and paper industry during 1951 reduced both its accident frequency rate (disabling injuries per 1,000,000 man-hours) and its severity rate (time charges—in days—per 1,000,000 man-hours) by 8 per cent. Among the 40 basic industries, pulp and paper ranks 24th in frequency and 21st in severity.

The all-industry average for frequency rate is 9.06, that for the pulp and paper industry 10.90. The all-industry figure for severity rate is 0.97, that for pulp and paper 0.97.

Industrial injury rates for last year, according to the Council, show a modest reduction in frequency but an equal increase in severity, as compared with 1950. Of the 40 basic industries, 27 reduced their frequency rates, while 20 reduced severity rates.

The communications industry again led all others by turning in the lowest employee frequency rate. Its rate was 1.79—a 13 per cent reduction. Electrical equipment ranked second with 4.04, followed by the cement industry with 4.22. Lumbering stayed at the bottom in 1951 with a 43.12 rate, but this represented an 8 per cent reduction. The frequency of coal mining accidents dropped 22 per cent, but that industry remained in the next-to-last position with a 34.12 rate. The clay products industry was third from the bottom, just below marine transportation.

Communications also had the lowest severity rate, leading all other industries with a rate of 0.09—a 25 per cent drop from 1950. The service industry slipped to fourth place in 1951 from second in 1950, with a 42 per cent increase. The tobacco industry ranked second with a 35 per cent drop to a rate of 0.15, just ahead of wholesale and retail trade. Printing and publishing fell from fourth to eighth. In terms of severity, coal mining once more stayed at the bottom of the list, with the highest accident severity rate—6.77—a 14 per cent decrease. Quarrying was next to last with 4.54—a 127 per cent jump in rate. Lumbering moved up a notch with a 6 per cent reduction to 4.52.

First Pulpwood Logging Survey Results Announced

A return of 36 questionnaires have been received by the National Safety Council in connection with the pulpwood logging survey issued January 11. These reports, containing full data of operations, were received from firms representing eight states, three Canadian provinces, and one foreign country (Japan).

According to the report by Seth Jackson, chairman of the Pulpwood Logging Publications Committee, the following information was presented:

(*1*) Twenty-three firms employed a safety director in the woods division; (*2*) nineteen firms reported active woods safety programs, with an average of five supervisors per company responsible for safety; (*3*) companies averaged 41 camps each, with 73 employees per camp (total average number of employees per company was 2,030); (*4*) twenty-seven firms kept full accident

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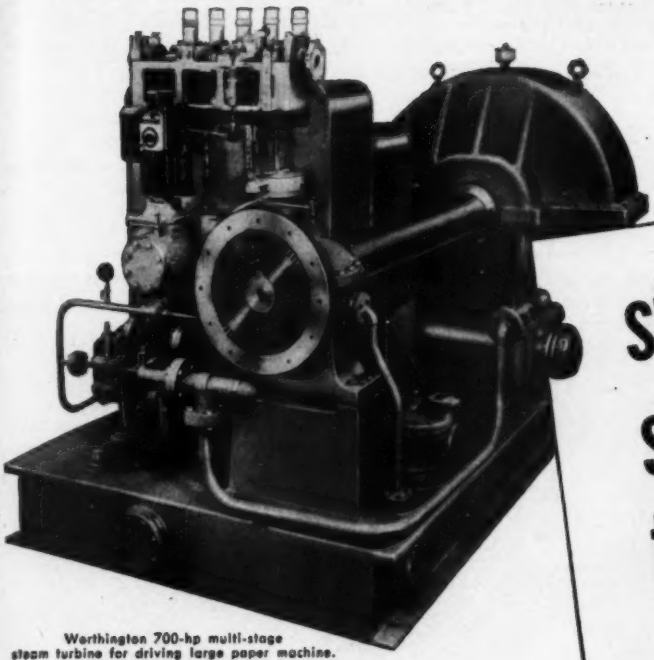
Kalamazoo GLAZED TILE
TANKS and CHESTS
Yes, this is a picture of what you get from Kalamazoo ... smooth-surfaced, corrosion-proof tanks and chests ... engineered to your needs ... erected by experts. Bring your problem to Kalamazoo ... over 25 years of "know-how". Get all the facts today ... you'll be 'way ahead.
Kalamazoo TANK and SILO COMPANY
TILE TANK DIVISION
727 HARRISON ST., KALAMAZOO, MICHIGAN



Worthington 700-hp multi-stage steam turbine for driving large paper machine. Ross Exchanger equipped.

steady speed... steady oil temperature

...this Worthington steam-turbine drive is equipped with a Ross Exchanger

Steam turbine drives — that's Worthington's cost-saving answer to the need for constant-speed operation of paper machines. On this 700 hp, multi-stage unit, a Ross Exchanger is furnished as a built-in component. Its job, as on many other Worthington turbines: to maintain lube oil temperature within most effective limits as a safeguard to vital parts.

Throughout the paper and pulp industry there are supercalenders, pulp refiners, dryers, centrifugal pumps and other machines dependent upon Ross Exchangers for temperature protection, either of lube oil, or hydraulic fluids, or both. Acquaint yourself with all the advantages of these completely standardized, pre-engineered, mass produced units by writing for Bulletin 2.1K1.

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records; (5) frequency rate averages for 1950 and 1951 were 101.0 and 88.0, respectively; (6) severity rate averages for 1950 and 1951 were 4.23 and 3.03, respectively; (7) most troublesome accidents were axe cuts, strains, pulp hooks, falls, and falling objects, and (8) plans for reducing accidents included foreman training, use of films, personal contacts, traveling old-timer instructing man, direct contact with large chart showing accident hazards, first aid training, instructional talks, job instruction, safety meetings, and competitions with prizes and awards.

Mr. Jackson has declared that a complete review indicates that posters, safety booklets, and other material is needed. It is estimated that 20 per cent of the material should be directed to help supervision and the remaining 80 per cent designed to aid the worker.

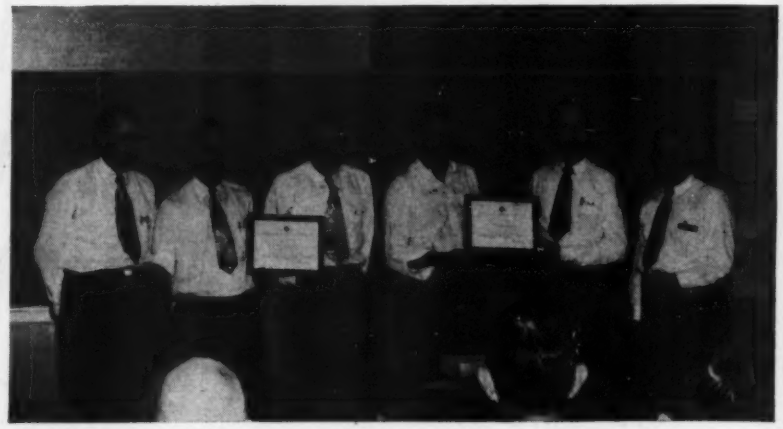
Southern Advance Bag & Paper Receives Two Awards

Two certificates for outstanding safety records were presented to Southern Advance Bag & Paper Co. Inc., Hodge, La., April 30 at a meeting of the firm's executive safety committee. The awards, presented by the National Safety Council, went to the bag mills and the pulp and paper mills.

These two departments received the prizes because they had accident rates below their group averages in the 1951 Paper Industry Safety Contest conducted by the NSC, and also had recorded reductions in their rates for the previous contest.

Fred O. Soughton, service and safety supervisor for LongLac Pulp & Paper Co. Ltd., Terrace Bay, Ont., and a member of the NSC Pulp and Paper Section executive committee, made the presentation. He praised both supervisory and worker personnel. Only 124 plants in the United States and Canada were so honored.

P. J. Hannan, pulp mill superintendent, and C. C. Garner, paper mill superintendent, accepted the award for their departments. Fred Schmidt, superintendent of bag mill No. 1, and Carl Etter, superintendent of bag mill No. 2, accepted for the bag mills.



ACCEPTING SAFETY AWARD for Southern Advance Bag & Paper Co. were (l to r): Dallas Henry, safety coordinator; Carl Etter, superintendent of No. 2 bag mill; Fred Schmidt, superintendent of No. 1 bag mill; C. C. Garner, paper mill superintendent, and P. J. Hannan, pulp mill superintendent; to the far right is Fred O. Soughton of LongLac Pulp & Paper Co., Ltd., who made the presentation

MISCO STAINLESS STEEL CASTINGS

FOR ALL EQUIPMENT EXPOSED TO CORROSION BY SULPHITE ACIDS OR OTHER CORROSIVE AGENTS

ALLOY CASTING DIVISION Michigan Steel Casting Company 1999 GUOIN STREET • DETROIT 7, MICHIGAN MISCO

ONE OF THE WORLD'S PIONEER PRODUCERS AND DISTRIBUTORS OF HEAT AND CORROSION RESISTING ALLOYS

Typical wool showroom, where buyers make their selections.

Photographs courtesy of Wool Bureau, Inc.

Out Where Huyck Felts Begin

First, the fleece. From 1,500 classified types, buyers choose only those special wools that meet the exacting requirements of Huyck Felts. In the principal wool-growing countries of the world this discriminating selection goes on. For these must be just certain wools, rare and costly.

In they come, to the great wool warehouses at Rensselaer, New York. From this vast supply, skilled sorters select the grades specified for each type of felt, then blend them for the precise task the felt is to perform on the paper machine.

This is the first, and only the first step in making the famous Huyck felts which for '82 years have rendered such essential service to the pulp and paper industry.

KENWOOD TEXTILE PRODUCTS

HUYCK *Felts*

F. C. Huyck & Sons — Kenwood Mills — Rensselaer, N. Y.

Foreign Abstracts . . . . . .

Fungal damage in pulpwood

A literature survey is given with 13 references. The author describes the effects of brown rots on sprucewood and resulting pulps (**I**). Photomicrographs show the distribution of hyphae in the wood these preferentially attack the carbohydrates. E.g., **I** from a sound wood contained 94.2 per cent alpha-cellulose, showed an "alkali resistance" of 84.3 per cent, and a copper number of 2.2; whereas, a very badly decayed wood gave **I** with 51.1 per cent alpha-cellulose, showed an alkali resistance of 40.8 per cent and a copper number of 9.2 per cent.

I from a seriously infected wood showed the presence of hyphae in the lumina of fibers (which persisted even after pulping), as well as perforations of the fiber walls, tracheids plugged with granular material, and/or gelatinous substances. The changes in wood substance could be followed by noting color changes, decreases in density, and increases in copper number and in alkali solubility. Theodor Höpner (Central Laboratory, Zellstoffwerke Aschaffenburg, Germany). *Das Papier*, **6**, 47-53 (1952). (In German).

Pulping sprucewood with alkaline dithionite

Recently, Montano and Hossfeld [*Tappi*, **34**, 468 (1951)] reported that aspenwood shavings were not satisfactorily pulped with alkaline sodium dithionite (**I**) (i.e., hydrosulphite) by heating 2 hours at 160 deg. The experience of the present authors with sprucewood indicates that with suitably controlled conditions and optimal concentrations of **I** and sodium hydroxide, delignification occurs satisfactorily and that an excellent grade of pulp results.

Systematic studies were undertaken in which concentrations of **I** were varied from zero up to 7.18 per cent, and the sodium hydroxide concentrations varied from 0.5 to 4.0 per cent. With 3-4 per cent NaOH and about 6.25 per cent **I**, a pulp yield of about 45 per cent was obtained with a lignin content of about 2.4 per cent. Extensive tabulated data are given, and a series of interesting comparative experiments were made, in which the same wood was subjected to a soda, a kraft, and a dithionite cook, so that in all cases, the pulp yields approximated 44.5 per cent. Summarized results are given in the following table.

Full data are also given on the strength properties of the unbleached and bleached pulps. Invariably, the strength properties of the soda pulp were the lowest and those of the dithionite pulp the highest, with the kraft pulp intermediate between the two. Whereas the dithionite (bleached and unbleached) pulps required a somewhat longer beating time to reach 50 deg. Schopper-Riegler, the developed strength was surprisingly high. Thus, in the unbleached dithionite pulp, the breaking length was 9443 meters, the burst 6.1 kg/cm², the Brecht-Imset tear was 302 cm. g/cm; the folding endurance was 6448 (double folds). Similarly high values were also obtained with bleach $Na_2S_2O_4$ pulp. Furthermore, the brightness of this pulp was 86 per cent (i.e., much higher than that of the kraft pulp) and required far less bleaching chemicals than did the other pulps. It is evident that dithionite is a very interesting pulping agent when suitably used. Georg Jayme and Günther Wörner. *Das Papier*, **6**, 80-6 (1952). (In German).

Determination of phosphates in flameproofed wood fibers

Fibrous products are often impregnated with phosphates which serve as flame- and fire-proofing agents. The author has developed a new procedure for P_2O_5 in the analysis of such products. The usual gravimetric method is not only time consuming but gives results which are usually from 1-4 per cent too low. The following titrimetric determination was developed.

A carefully weighed sample (about 2 grams air-dry) was defibered, suspended in 300 cc. distilled water, heated to boiling, then cooled and titrated cautiously to pH 4.4 using "Dimethyl yellow" (which is probably "Butter yellow" used by Kolthoff) as indicator (using either 0.1 *N* NaOH or 0.1 *N* HCl, depending on the original pH). The color of the suspension should be compared with that of a 0.05 molar KH_2PO_4 solution in the presence of similar amount of indicator. Thereupon, the pulp suspension is treated with a few drops of phenolphthalein and then titrated to incipient pink with 0.1 *N* NaOH (thymolphthalein may also be used, this giving a less definite green end point). Whenever the pulp suspension also contains Ca^{++} or Mg^{++} ions, neutral potassium oxalate must be added to prevent their interference with the titration. One cc. 0.1 *N* NaOH = 7.1 mg. P_2O_5.

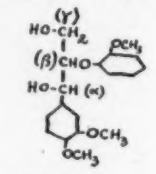
Sprucewood Pulps by Three Different Methods

	Chemicals	Temperature	Time	% Yields	% Lignin in pulp	Brightness, % (based on $BaSO_4$)
Soda	3.48% NaOH	180°	4 hrs.	44.70	5.70	40.0
Kraft	3.38% NaOH, 1.37% Na_2S, 0.55% Na_2CO_3	180°	4 hrs.	44.80	3.00	43.2
Dithionite	3.48% NaOH, 6.25% $Na_2S_2O_4$	180°	8 hrs.	44.30	2.17	57.0

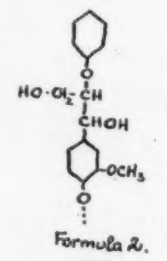
The titration method is rapid and gives results which are usually accurate to ± 3 per cent of the phosphate present in the fiber. Arnold Broniatowski. *Svensk Papperstidn.*, **55**, 313-315 (1952). (In German).

The sulphonatable groups in lignin

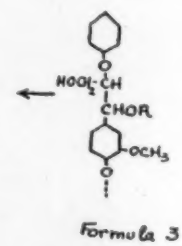
Lignin appears to have three types of sulphonatable groups (which have been designated as X, Z, and B. The X and Z groups (previously designated together as "A" groups) are sulphonated both by acid and neutral sulphite solutions. The B groups are sulphonated only under acidic conditions. When the wood is delignified, the B groups appear to be converted into another type, designated as the "B′ groups", which differ from the B groups in that they can be sulphonated by neutral sulphite solutions (although much more slowly than are X or Z groups). This conversion of B groups indicates that these are the groupings which bind the lignin units together or which bind them to the carbohydrates of the wood.



Formula 1.



Formula 2. (B′)



Formula 3 (B)

In arriving at these hypotheses the authors have prepared and studied the properties of the β-guaiacyl ether of veratryl glycerol (Formula 1). When this diol is heated with sulphite solutions of various pH, the hydroxyl group in the α position is replaced with a sulphonic acid group. This has already been demonstrated in the case of model substances of the benzyl or benzyl ether types, but in contrast to these, the diol (Formula 1) is sulphonated *so slowly* that the rate of sulphonation is of the same order as that of the B′ groups. This may indicate that these B′ groups can be assigned formula 2 and that the change of B groups into B′ groups may involve the hydrolysis of benzyl alkyl ethers to the alcohols. Thus, the B groups may have the general formula 3. This theory gains support from sulphonation experiments with an alpha alkyl ether of diol 1. Compound 1 resembles sulphonatable groups in lignin also in its mode of reaction with the glycolic acid and with HCl in ethanol. Erich Adler, Bengt O. Lindgren and Vela Saeden. *Svensk Papperstidn.*, **55**, 245-53 (1952). (In English).

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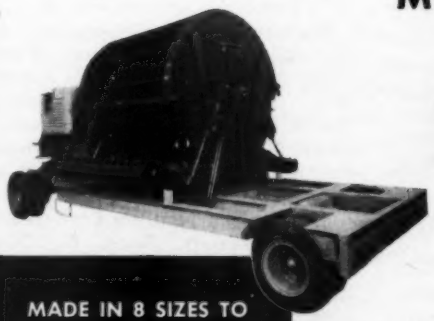

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Superintendents Convention . . . .

(Continued from page 481)

log, through a continuous attack on fibre waste. "By developing pulping processes that permit use of a broader range of pulping species," Mr. Ritchie explained, "the domestic wood pulp industry would appear to have met effectively for sometime to come the recurring threat of domestic fibre shortages."

Discussing wood harvesting, he said that "the domestic wood pulp industry is currently using about 14 per cent of the total volume of wood harvested annually from America's forests; 20 years ago it was using only about 5 per cent. Canada and Sweden are currently using over ⅓ of their total forest cut for pulp. Practical considerations of forest economics, as well as social considerations, may well dictate a continuing long-range trend toward an increasing diversion of U.S. forest resources to wood pulp production.

After reviewing the tremendous growth in U.S. wood pulp requirements and the growth of domestic production, Mr. Ritchie reported that "the current oversupply of pulp and paper, in my judgment, is attributable to two factors: (1) the operation of an inventory cycle in pulp products, and (2) the operation of an expansion cycle in pulp and pulp products."

Social events, plant visits

Along with the "working" portion of the convention went a well-rounded program of social events and a schedule of plant visits. In addition to entertainment arranged for the wives of those attending the meeting, there were two evening banquets and the annual Wake 'Em Up Breakfast to which all were invited.

Music and comedy acts followed a program of speakers at the Wednesday evening dinner, at which Ford C. Frick, commissioner of baseball, gave the principal address. Mr. Frick likened baseball to true democracy, explaining that in that sport, as in few others, there is real equality and opportunity based only on an ability to play the game. His talk was titled, "The Four Freedoms of Baseball." In charge of the meeting was President Singletary. Norman O. Weil of W. S. Tyler Co. was master of ceremonies. Present at the speakers' table, in addition to those on the program, were Casey Stengel, manager of the New York Yankees; Lyall Smith, sports editor of the *Detroit Free Press*, and Walter O. Briggs, president of the Detroit Tigers. Prior to the banquet, the allied industries presented their Ninth Annual Get-Together party. Mr. Weil was chairman.

The Wake 'Em Up Breakfast featured comedy acts in which members of the audience participated. Ted Barry, formerly of the radio show "Queen for a Day," was the master of ceremonies. Chairman for the event was Kenneth McClelland of J. E. Rhoads & Sons; co-chairman was O. W. Callighan of Edgar Bros. Co.

At the concluding banquet on the final evening Glen Sutton, the retiring president, officially turned over the gavel of his office to Mr. Singletary. Dancing followed the dinner.

Plant visits on the second day of the convention included trips to Wyadotte Chemicals Corp., Ford Motor Co., *The Detroit News*, and Detroit Sulphite Pulp & Paper Co. Approximately 50 participated in the latter trip and were guided through the complete pulp and paper mill operation, including inspections of the cylinder, fourdrinier, and Yankee machines. In charge of arrangements for the plant visits was Roy L. Davis of Detroit Sulphite; his co-chairman was Paul Burchfield.

Technical meetings

The final day was given over to eight meetings at which technical papers were presented by authorities in the following fields: sulphite, kraft, paperboard, plant and power engineering, high-yield pulping, paper converting, production methods, and paper machines. (Abridgments of many of these papers will appear in a forthcoming issue of THE PAPER INDUSTRY.) Those participating in the meetings were as follows:

Sulphite—Chairman, Gordon Morseth, Detroit Sulphite Pulp & Paper Co.; co-chairman, John A. Minser, Crane Co., Chicago. Participants: John N. Cadaret, Wayne University, Detroit, "Sulphite Superintendents — Thinkers or Stinkers?"; C. N. Hager Jr., Diamond Match Co., Plattsburg, N.Y., "A Few Thoughts on the Pitch Problem"; J. K. Perkins, Improved Paper Machinery Corp., Nashua, N.H., "Valveless Vacuum Decker—Its Construction and Performance."

Kraft—Chairman, R. C. Bullock, Ecusta Paper Corp., Pisgah Forest, N.C.; co-chairmen, Sven Fahlgren, Bird Machine Co., S. Walpole, Mass., and Vernon Woodside, Mathieson Chemical Corp., New Orleans. Participants: R. H. Worrell, Southland Paper Mills Inc., Lufkin, Texas, "The Importance of Liquid Volume and Liquor Concentrations on Kraft Pulping"; Malcolm Pineo, Brunswick Pulp & Paper Co., Brunswick, Ga., "Variables in Kraft Pulping"; Tany Agronin, Shartle Bros. Machine Co., Middletown, Ohio, "Further Developments in Equipment for Preliminary Refining of Kraft."

Paperboard—Chairman, Harry E. Hadley, Gardner Board & Carton Co., Middletown, Ohio; co-chairman, Sam Weber, The Black-Clawson Co., Hamilton, Ohio. Participants: Peter R. Scott, C. B. Cottrell & Sons Co., Westerly, R.I., "What's Wrong with Paperboard?"; G. B. Greenwood, Robert Gair Co. Inc., New York, N.Y., "Robert Gair's Trainee Program"; B. E. Sooy, Gardner Board & Carton, "Quality Control Procedures"; Warren W. Macklem, Black-Clawson, "Crownless Press Rolls."

Plant and Power Engineering—Chairman, Albert Sherwood, Sutherland Paper Co., Kalamazoo; co-chairman, J. L. Van Nort, Reliance Electric & Engineering Co., Cleveland. Participants: A. W. Harrington, W. J. Altschwager, A. E. Dillonaire, H. L. Kelley, T. J. Ethier and R. J. Weesner, The Louis Allis Co., Milwaukee, "Electrical Adjustable Speed Drives in the Pulp and Paper Industry"; LeRoy J. Bauer, The Pierce Consulting Engineering Co., Boston, "Making the Equipment Installation"; J. R. Curtis, Scott Paper Co., Chester, Pa., "Increased Production from Existing Machines"; W. C. Bloomquist, General Electric Co., Schenectady, N.Y., "The Gas Turbine for Mill Power and Steam Requirements."

High-yield Pulping—Chairman, L. W. Murtfeldt, Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.; co-chairman, R. G. Goodwin, Pandia Inc., New York, N.Y. Participants: Dr. J. A. Hall, director, Forest Products Laboratory, Madison, Wis., "Today's Semichemical Pulp Industry"; S. I. Aronovsky, Northern Regional Research Laboratory, Peoria, Ill., "The American Paper Industry Needs Straw and Bagasse"; Romulus S. von Hazmburg, United States Gypsum Co., Chicago, "Roofing Felt—Yesterday and Today."

Paper Converting—Chairman, Howard H. Street, National Vulcanized Fibre Co., Yorklyn, Del.; co-chairman, Ray A. Thompson, Samuel M. Langston Co., Camden, N.J. Participants: Frank W. Egan, Frank W. Egan & Co., Bound Brook, N.J., "Impregnating and Coating of Specialty Papers"; Cletus Wetli, Hudson-Sharp Machine Co., Green Bay, "Processing Soft Papers"; K. W. Osborne, Ohio Boxboard Co., Rittman, Ohio, "Paper Characteristics for Laminating"; Rex Patton, Suther-

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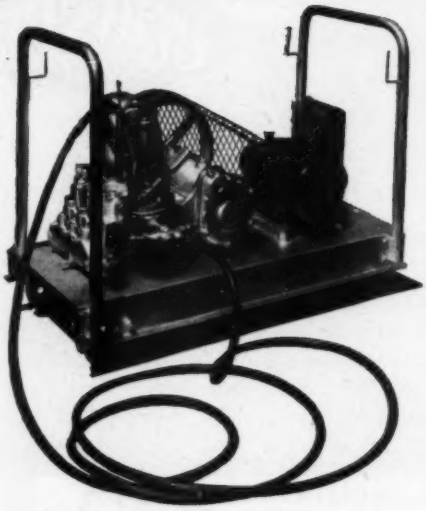

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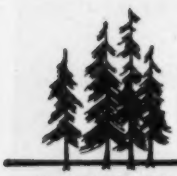

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land Paper, Kalamazoo, "Some Fundamentals of Good Package Design."

Production Methods—Chairman, Donald R. Dick, Howard Smith Paper Mills Ltd., Cornwall, Ont.; co-chairman, Hoke Martin, Hercules Powder Co., Kalamazoo. Participants: L. A. Kramer, Victor Chemical Works, Chicago, "Polyphosphates in the Paper Industry"; R. F. Merwin and R. C. Hoff, Eriez Mfg. Co., Erie, Pa., "The Tramp Iron Problem in the Paper Industry"; J. H. DeGroff, Buckman Laboratories Inc., Memphis, "Clean-up Methods as an Aid to Slime Control"; A. W. Huberty, Oliver United Filters Inc., Chicago, "Up-flow Screening of Chemical Pulp"; James Thornton, Downingtown Mfg. Co., Downingtown, Pa., "Downingtown Masson-Scott Cutter" (a film).

Paper Machines—Chairman, Raymond L. Barton, Michigan Paper Co., Plainwell, Mich.; co-chairman, A. Stewart Murray, Beloit Iron Works, Beloit, Wis. Participants: Jack Buechler, Shartle Bros. Machine Co., Middletown, Ohio, "New Design of Fourdrinier Wet End"; L. G. Janett, J. O. Ross Engineering Corp., Chicago,. "Dryer Felts in Relation to Paper Drying"; D. R. Simonds, Beloit Iron Works, "Inlets and Slices"; Robert A. Miller, Kalamazoo Vegetable Parchment Co., Parchment, Mich., "How to Calculate Cost of Down Time on Paper Machines"; J. H. Rediske, General Electric Co., Richland, Wash., "Uses and Application of Nuclear Traces in the Paper Industry."

President's message

At the business session held on the opening day, Glen Sutton presented his annual message. After thanking members and co-workers for their help during the past year, Mr. Sutton reviewed the progress of the Association since his term of office began. "Growth in our active membership is linked up directly with the quality of our Division meetings," he declared. "Here again, we find evidence of good meetings, because the roster of the Association was increased during the past year by approximately 100 members.

"May I suggest, however, that we do not become complacent by this growth; but rather that we make every effort to get more members with the best of qualifications. Most certainly, we have a big job ahead of us before we can say we have all the members possible to secure for the organization.

"The past year also has witnessed an increase in cooperation between technical and practical men to the end that today we have a better and stronger Association than a year ago. This progress, in turn, should benefit every company represented by our membership. Can anyone deny that the logical approach to further growth in membership is to continually better service.

"The continued support of our Industrial Affiliate members has been gratifying. In this area of our activity, there has also been a remarkable growth this past year."

New fifth vice president

A. E. Bachmann of Missisquoi Corp. was nominated and elected to the post of fifth vice president at the business session. Other officers for the 1952-53 year are Donald R. Dick, Howard Smith Paper Mills Ltd., first vice president; Harry E. Hadley, The Gardner Board & Carton Co., second vice president; Howard H. Street, National Vulcanized Fibre Co., third vice president, and Martin J. Auchter, Hoberg Paper Mills, fourth vice president.

Convention committee

Glen Sutton was general chairman of the convention. Manager of the convention was Harry E. Weston, secretary and treasurer of the Association. The hospitality committee was as follows: Mr. Sutton (chairman), Gordon K. Singletary, Donald R. Dick, Harry E. Hadley, Howard H. Street, and Martin J. Auchter. Olin W. Callighan was in charge of entertainment. Mrs. Sutton led the ladies committee; her co-workers were Mrs. Singletary, Mrs. Hadley, Mrs.

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This increased production capacity insures a plentiful supply of Dicalite products for the future. Users can be confident of dependable delivery; with four plants in operation chances of interrupted supply are greatly reduced.

Advanced design of the new plant has afforded greater operating flexibility and extended processing ranges. Specifications for performance and quality of each product are readily maintained. Research data are being accumulated to aid in developing new and improved Dicalite products for future industrial use.

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Street, and Mrs. Auchter. Members of the golf committee were Alfred B. Perlick (chairman), H. L. Vanderberg, and Howard Roderick.

Superintendents Papers Presented at Detroit

Polyphosphates in the Paper Industry

L. A. Kramer, Victor Chemical Works, Chicago

The name polyphosphate is actually a family name. Most of the polyphosphates have one distinguishing family characteristic, and that is that they are the result of the high temperature dehydration of the simpler sodium and potassium phosphates.

The polyphosphates, because of their unique chemical and physical properties, have in recent years found many uses in a variety of industries. Tetrasodium pyrophosphate and sodium tripolyphosphate, two prominent members of this family, and both of which enjoy wide distribution and relatively low cost levels, play indispensable roles in soap manufacturing, conditioning of oil drilling muds, purifying of china clay, deinking of newsprint, detergent compounding, and water softening. These industries have one thing in common—that is, they each use tremendous amounts of water per unit weight of product. In this respect, the pulp and paper industry is no outsider.

Water treatment

One of the best known uses of polyphosphates is in water softening to combat calcium and magnesium hardness. When the polyphosphates are used for this purpose, unlike with many other water softening chemicals, troublesome precipitates are eliminated.

One of the first polyphosphates to be developed for this service was tetrasodium pyrophosphate. The effect of this compound, when used in hard water, can be seen in Fig. 1. The two graduates, as illustrated, are filled with water at 150 ppm hardness and contain soap. The cylinder on the left actually contains more anhydrous soap than its partner, but it shows no suds because all of the soap has been consumed in softening the water. The cylinder on the right, which contains the lesser amount of soap, has abundant suds. The pyrophosphate present in the water has liberated the soap from combination with magnesium, thus making it available for sudsing and detergent purposes. Tetrasodium pyrophosphate also peptizes or disperses calcium precipitates.

Sodium tripolyphosphate, when used with soaps in hard water, acts in much the same manner as tetrasodium pyrophosphate. In fact, the two compounds are essentially equivalent in their peptizing power. The tripolyphosphate, however, has a higher calcium repression value. Hence, it is superior so far as water softening alone is considered.

Sodium tripolyphosphate is recommended for all general water softening purposes. Fig. 2 displays a graph showing the pronounced effect of sodium tripolyphosphate upon waters of different hardnesses. The graph reveals that complete softening can be achieved by the use of small amounts of this polyphosphate.

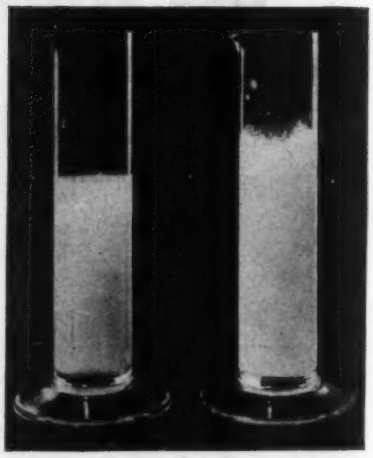

Fig. 1

Application of sodium tripolyphosphate is recommended especially for the prevention of scale deposit in washing systems and in the evaporation of waste lyes. This scale inhibition takes place at concentrations of polyphosphate far below that required for softening the water. The polyphosphate simply inhibits the crystallization of scale.

Pitch control

Although the largest, single, industrial use or commercial application of sodium tripolyphosphate and tetrasodium pyrophosphate utilizes the water softening and soap building properties of these two compounds, another very important characteristic of the materials is their peptizing power. This peptizing action is of especal value in cases where a negatively charged material is of gummy, adhesive, or viscous nature. The polyphosphates, in such instances, prevent the finely divided particles resulting from its action with the negatively charged material from adhering or depositing as sticky masses.

Since the polyphosphates give negative ions of high valence in solution, it follows that they are exceptionally efficient in peptizing negative colloids. In other words, the polyphosphates hold such materials in suspension and stabilize them. They also are useful in coagulating or precipitating positive colloids.

The peptizing action of the polyphosphates is excellently illustrated in Fig. 3. Both cylinders in the exhibit contain hard water to which trisodium phosphate has been added. One cylinder, in addition, contains a small amount of tetrasodium pyrophosphate. The water without the tetrasodium pyrophosphate shows a sludgy precipitate of calcium phosphate and magnesium hydroxide. The sludge in the pyrophosphate-treated water is peptized and cannot coagulate.

The pulp and paper industry has made use of this property of pyrophosphate in pitch control, in rayon pulp bleaching, and in the deflocculation of clay. As polyphosphates become better known to the industry, further application for them will suggest themselves.

*Some of the remaining papers presented at Detroit will appear in forthcoming issues of THE PAPER INDUSTRY.

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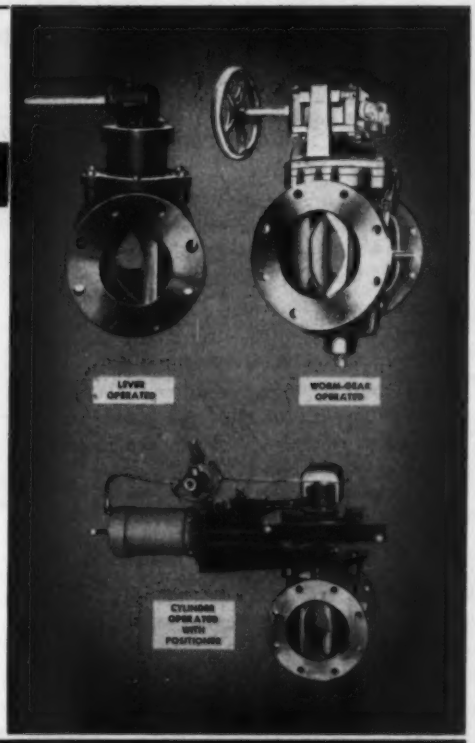

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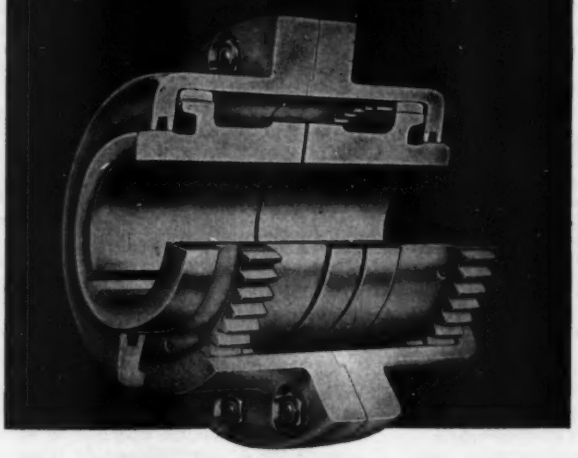

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The deposition of pitch in the manufacture of paper, especially in the presence of hard water, has long been troublesome. Dispersed pitch, a negative colloid, is partially coagulated by the calcium and magnesium ions of the hard water. This difficulty, in the past, has been met by using alum to coagulate the pitch before the trouble-making stage was reached.

The modern method for meeting the difficulty makes use of the powerful phosphatic peptizing agents. They keep the colloidal pitch dispersed even in the presence of hard water.

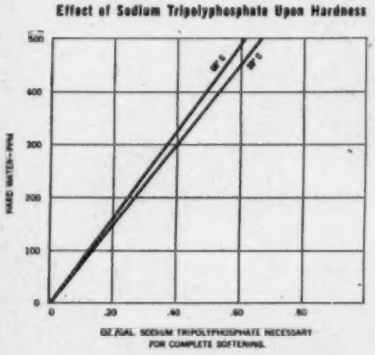
Effect of Sodium Tripolyphosphate Upon Hardness
HARD WATER—PPM
EQUAL SODIUM TRIPOLYPHOSPHATE NECESSARY FOR COMPLETE SOFTENING

Fig. 2

These polyphosphate chemicals have two distinct advantages over alum. First, they are alkaline and function in alkaline solution. They do not, therefore, cause corrosion troubles, such as are encountered when alum is employed and which decomposes to give an acidic solution of low pH. Second, the amount of polyphosphate necessary to achieve the peptizing effect is less than in the case where alum is added and is therefore more economical.

One case is known of a newsprint mill in which pitch was introduced by the groundwood, calcium by the sulphite, and to add to its troubles, it had a rather hard water to handle. The mill found that the pitch could be kept in suspension by adding only one pound of sodium polyphosphate per ton of wood.[1] The polyphosphate was

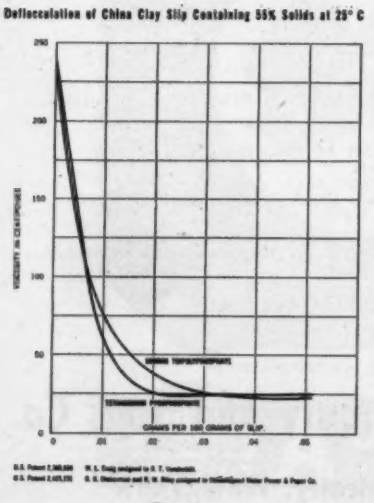
Deflocculation of China Clay Slip Containing 55% Solids at 25° C
VISCOSITY IN CENTIPOISES
SODIUM TRIPOLYPHOSPHATE
TETRASODIUM PYROPHOSPHATE
GRAMS PER 100 GRAMS OF W.P.

Fig. 4

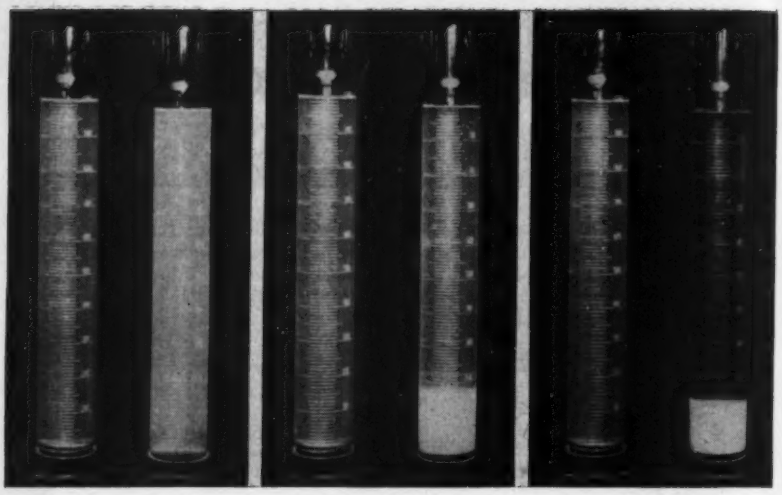

Fig. 3

introduced from a wooden dissolving box at a constant rate into the head of each grinder magazine. This treatment was found to be completely effective and has now replaced the former alum procedure entirely. It should be emphasized, however, that the alum and phosphate processes must not be combined since one process neutralizes the effect of the other.

At another mill, pitch difficulties were experienced only at the start of operations, such as at the beginning of a work-week, because of an influx of hard water. This difficulty was overcome by adding 20 pounds of polyphosphate to the mixed stock chest prior to shutdown for the weekend. Continuous additions of polyphosphate at rates varying from ½ to 2 pounds per ton of wood,[1] depending upon pitch content, have been shown by plant runs to be most effective. The beneficial effect of the treatment has been checked repeatedly by stopping the addition and then by later resuming it.

Other pulp applications

The polyphosphates perform several useful functions in the manufacture of rayon pulp. They not only aid in washing and bleaching, but they also give iron control in the process. So far as bleaching is concerned, they have two applications; namely, in the washing of the digested pulp before bleaching, and in the bleach itself.

The use of sodium polyphosphates in the wash water at the blow pits or in subsequent screening operations reduce the amount of chlorine required to give a standard brightness. The resulting milder bleaching treatment means greater fiber strength. In the bleach itself, it is logical to remove as much coloring matter as possible by suspension and washing instead of putting the burden of removal upon the bleach. Here the peptizing effect of the polyphosphates will be found most valuable.

Since rayon pulp is required to have a very low iron content, the sodium polyphosphates contribute another valuable function. By forming a clear sol with iron, they hold the latter in solution so that it may be readily washed out of the pulp instead of precipitating therein. Thus, the maintenance of low pitch and low iron may be simultaneously achieved.

Another application for the polyphosphates is in connection with the sodium or zinc hydrosulfite bleaching of groundwood. In this application, it is understood that the use of polyphosphates gives several points higher brightness readings.

Another application of the polyphosphates in bleaching is in connection with the calcium hypochlorite bleach of regular sulphite pulp. In this process, use has been made of the polyphosphates to prevent the deposition of calcium scale in some of the intermediate wash steps.

Deflocculation of clay

Improvements in the processing and preparation of clay or kaolin have resulted in its becoming one of the favorite materials for the production of high-finished coated papers. Here again, the polyphosphates have played an important role in the purification processes at the plants of the clay producers and in the application of the clay at the coating mills.

It was not until research discovered that the particle size of the clay had a marked effect upon the quality of the finish that real progress in this problem was shown. It is now quite well established that a good coating clay should have at least 80 per cent of its particles less than 2 microns in diameter. Practically all of the particles should be smaller than 6 microns. With such specifications, a very finely divided material, the tonnage-production of which is a real accomplishment, is indicated.

Since the polyphosphates are very powerful dispersing agents or peptizers, they are of considerable value to the clay producers. They make possible the separation in water suspension of each tiny particle from its neighbor; they permit the removal of the larger unwanted particles by levigation or centrifugal methods. With such perfect separation, de-colorizing operations are carried out with maximum efficiency.

Coating slurries

The same mechanism of complete dispersion is of great value in the coating mill. While clay may be considered as an inert

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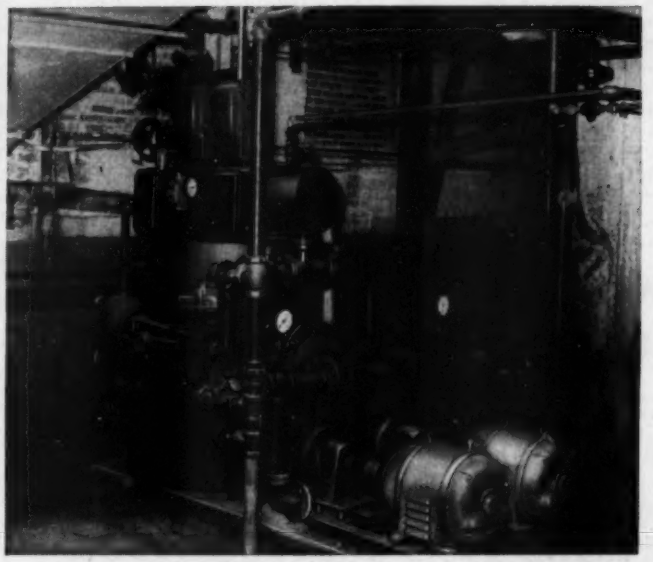

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material, the behavior of clay from batch to batch is quite unpredictable. Some clay will contain minute quantities of such hard water elements as calcium, magnesium and iron salts. This characteristic brings the complex forming properities of the polyphosphates into play.

Practically all coating mills prepare their clay slips at one point and pump the slurry to the place of use. This procedure necessitates the use of an efficient and foolproof dispersing agent if high-ratio slips are to be transported. Experience has shown that the polyphosphates are the preferred dispersing agents for this service. They are effective in small quantities, and are not critical in the event an excessive amount is added accidentally.

Fig. 4 depicts the drop in viscosity of a 55 per cent solids clay slip as produced by sodium tripolyphosphate and tetrasodium pyrophosphate.

Deinking

Tetrasodium pyrophosphate and sodium tripolyphosphate are useful additives in the deinking and reworking of waste paper. These chemicals, due to their superior cleaning and dispersing properties, aid in the removal of pigments and inks. Gummy or resinous materials, such as are frequently found in certain types of waste paper, are prevented by additions of either of the phosphates to the pulper, from depositing upon the equipment. In many cases, the waste paper contains considerable amounts of clay. Here again, the clay dispersing properties of the polyphosphates makes it possible to wash out the clay with a minimum of manipulation.

Felt conditioning

The polyphosphates also are especially useful in the washing and reconditioning of paper machine felts. Highly alkaline detergents have several deleterious effects on any wool fabric. These impairments are shrinkage, weakening, matting with loss of absorbency, embrittlement and shortened life.

For successful detergency, a minimum pH of 9 is required. This figure is approximately the pH of neutral soap. Optimum pH for detergency is 10.4 to 10.6.

Liability to damage of wool rises quite rapidly above a pH of 10, especially at temperatures about 100F.

The pH of a 1 per cent solution of sodium tripolyphosphate is 9.6; that of tetrasodium pryophosphate is 10.2; that of the common alkalies is well above 11.

Soaps are much more effective detergents than alkalies. One drawback to their use in felt washing, however, is that a felt cannot be washed free of them. Some of this remaining soap reacts with the hardness of the water to form insoluble calcium soap which reduces the absorbency of the felt. This action, of course, can be prevented by the use of polyphosphates. They not only prevent the precipitation of insoluble soaps, but redissolve those soaps already formed.

The sodium polyphosphates also have another useful property. To explain: where water has been softened by a cold process softener, precipitation of calcium carbonate may be incomplete due to the slowness of crystallization. This condition will lead to after-deposition of calcium carbonate in the felt of a paper machine as well as elsewhere. However, this after-deposition can be prevented by the presence of a few parts per million of sodium tripolyphosphate to inhibit the crystallization. The same benefits are achieved where ground waters containing dissolved bicarbonates lose carbon dioxide and become supersaturated with calcium carbonates.

References

1. H. Freeman. Pulp & Paper Magazine of Canada, Vol. 48, No. 8, July 1947, pp. 73-75.

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Importance of liquid volume and Liquor Concentration on Kraft Pulping

R. H. Worrell, Southland Paper Mills Inc., Lufkin, Texas

The kraft pulp mill and bleach plant of Southland Paper Mills produces pulps for conversion into newsprint and high quality liner board of folding box grades. The chemical pulp requirement for newsprint is semi-bleached kraft at 63 per cent G. E. brightness to the extent of 25 per cent in the total furnish, with groundwood making up the balance. The convenient package size for kraft pulp mills necessitated an over-design of the production capacity of the plant to produce this chemical pulp requirement. At the time the kraft pulp mill was started, its excess capacity was machine dried and sold on the open market. At the end of the war, the five-vat cylinder machine pulp dryer was

converted into a paperboard machine to the extent that a high-grade product was being produced employing the use of unbleached, semi-bleached, and full bleached kraft pulp in its furnishes.

The evolution of presently manufactured products indicated the necessity of some compromise cooking procedures in the kraft pulp mill. As more and more kraft was being bleached, it became necessary to produce an easier bleaching pulp in the interest of economy of bleaching chemicals. At the same time, the cylinder machine had been most fortunate in having a pulp furnish which was very strong to help it obtain a good start in marketing the product. By definition, this strong pulp is one which is capable of absorbing extremely high power input from refining without radical freeness drops to appreciably slow up drainage rate on the machine.

This pulp is produced with a rather high active alkali concentration employing a total of 5300 pounds of active alkali and 950 cubic feet of total volume. The disadvantages of this low volume were reflected in poor liquor circulation, extreme variation in the uniformity of cooking from bottom to top, a high percentage of rejects, high chemical consumption in the bleach plant, and high per cent of color reversion of the bleached pulps.

It was decided that the investigation should be centered only around the effect of some changes in liquid volume and liquor concentration in the digesters.

For the purpose of this paper, liquid volume is defined as being the total cubic feet of white liquor plus the cubic feet of dilution, which in this case is black liquor, to comprise the term "total volume." The liquor concentration is defined as pounds of active alkali, which comprises all of the sodium hydroxide and sodium sulphide, expressed as Na_2O, per cubic foot of total volume added.

The mill is equipped with three stationary digesters of 2750 cubic feet capacity employing direct steaming, manual relieving, forced circulation from bottom to top, cooking at 100 pounds pressure at the corresponding steam temperature for a period of 2 to 2¼ hours to sample, which is normally 21 TAPPI permanganate number.

Test cooks

Several test cooks were loaded with given amounts of active alkali and total liquid volume, and each one was designed to study the effect of these and to determine a compromise loading best suited for desired pulp qualities. To assist in presenting this discussion a tabulation is provided in order that the different loading schedules of the seven cooks might be observed. The discussion of each follows in the order of their entry.

Test No.	Active Alkali (A.A.) Pounds	White Liquor Volume, Cu. Ft.	Black Liquor Volume, Cu. Ft.	Total Volume Cu. Ft.	Conc. A.A. to Total Vol. Lb./Cu. Ft.
1	5,300	756	124	880	6.02
2	5,300	756	194	950	5.58
3	5,300	756	269	1025	5.16
4	5,300	756	344	1100	4.82
5	4,900	700	180	880	5.58
6	5,720	816	209	1025	5.58
7	6,120	874	226	1100	5.58

In cook No. 1, 5300 pounds active alkali and a total volume of 880 cubic feet was added giving a concentration of 6.02 pounds per cubic foot. Samples taken from the blow line at 2, 5, and 8 minute intervals showed a permanganate range of 18-23 from bottom to top. Such a wide variation in permanganate range indicated that the digester was not cooked uniformly, and although strength was maintained, this condition would be reflected in the cost of bleaching. This range was attributed to poor circulation from lack of sufficient liquid volume. The low total volume also was a contributing factor in that a high percentage of rejects was found.

In cook No. 2, a charge of 5300 pounds active alkali and a total volume of 950 cubic feet was added, giving a concentration of 5.58 pounds per cubic foot. This cook had been our established normal cooking practice. This digester charge produced a pulp of very good strength, but was not the uniform cook needed for easy bleaching. The results on blow line samples showed an improvement over the previous cook in that permanganate number variation indicated more uniformity. It was felt that the ultimate of ultimate of uniformity by further dilution had not been gained.

In cook No. 3, 5300 pounds of active alkali and a total volume of 1025 cubic feet was added, giving a concentration of 5.16 pounds per cubic foot. The degree of cook-

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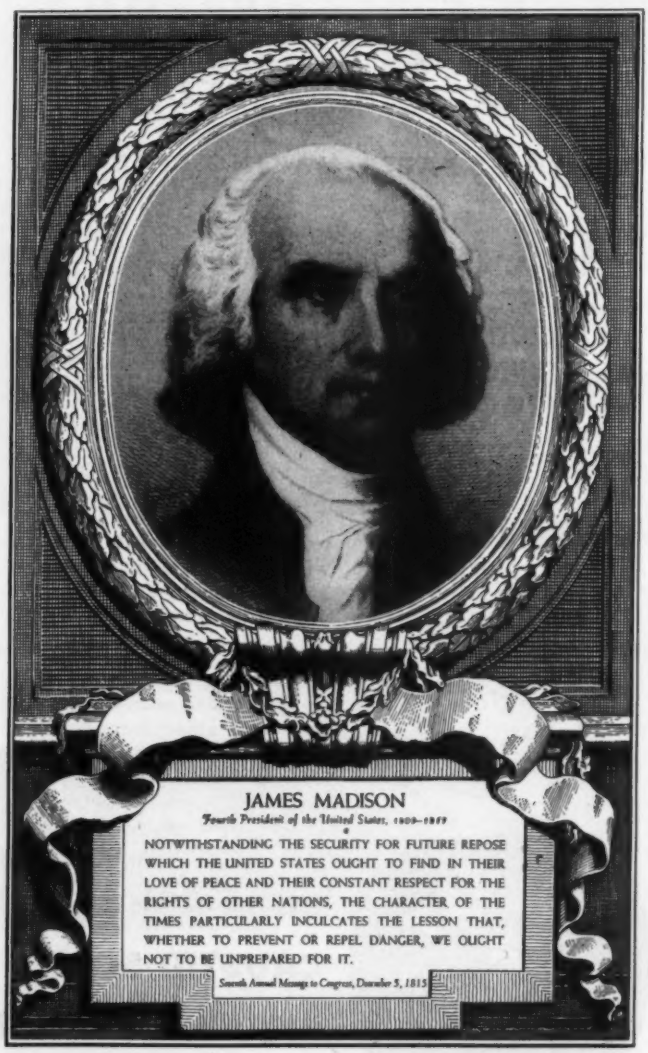
ing was relatively uniform from top to bottom with some possible drop in pulp strength. It was noted that a peak load was possible on the circulating pump throughout the cook, relieving was good, and less rejects were found. From the standpoint of liquid volume and liquor concentration, it was felt that this cook came close to meeting all the requirements for mill scale operation.

In cook No. 4, 5300 pounds active alkali and a total volume of 1100 cubic feet was added, which resulted in a concentration of 4.82 pounds per cubic foot. This cook showed good uniformity at a further sacrifice in strength, and was darker in color and cooked somewhat slower. Several facts developed which indicated that the limitation had been reached in increasing total volume. This cook did not relieve well, making it necessary to cut down on the volume of liquor circulating from the bottom to the top of the digester.

The preceding cooks were run to determine the effect of increasing liquid volume and correspondingly decreasing liquor concentrations on kraft pulping. Pulping with decreased concentration and high liquid volume produced a pulp which was the exact opposite of the earlier mentioned strong pulp. Pulp produced under these conditions developed very rapidly upon refining, to the extent that with low power input the freeness showed big drops with rapidly developing mullen characteristics.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Different volumes, white liquor constant

Cooks No. 5, 6, and 7 were run to determine the effect of different volumes with white liquor concentration remaining constant. In these cooks a concentration of 5.58 pounds per cubic foot was selected, based on the previous experience with Cook No. 2, which had produced a very strong pulp over a prolonged period. The procedure was changed by keeping the active alkali concentration constant by varying both active alkali added and total volume added.

In cook No. 5, 4900 pounds active alkali and 880 cubic feet total volume was added, giving a concentration of 5.58 pounds per cubic foot. As in Cook No. 1, the permanganate range varied in the same order, and a strong pulp was produced.

In cook No. 6, 5720 pounds of active alkali was used and a total volume of 1025 cubic feet was added, the concentration remaining fixed at 5.58 pounds per cubic foot. This cook produced a uniform pulp with good strength. In this case, the same total volume was added as in Cook No. 3, but the active alkali concentration was set at a figure above convenient liquor producing capacity for day by day operation.

A further step was taken in Cook No. 7, using 6120 pounds active alkali, increasing total volume to 1100 cubic feet and maintaining active alkali concentration at 5.58 pounds per cubic foot. This cook produced a pulp of uniform quality and good strength, also of a much lighter color.

In the first four cooks, the first conclusion is that low volume is to be excluded because there is not enough dilution to insure uniform cooking, although the higher concentration produces a very strong pulp. The second conclusion is that high volume with low concentration of active alkali produces a weak pulp. The third conclusion is that by increasing total volume and maintaining concentration of active alkali to the reasonable limitation of capacity and economy, the qualities of strength, uniformity and bleachibility can be maintained.

In summarizing, the conditions brought about by the necessity for an easy bleaching pulp made this investigation of liquid volume and liquor concentration of utmost importance. As previously mentioned, our normal operational level was at 5300 pounds total active alkali and 950 pounds cubic feet total volume, giving a concentration of active alkali at 5.58 pounds per cubic foot. This cooking charge produced a very strong pulp. Therefore, these manipulations involving changes in liquid volume and liquor concentration were made to ascertain their effect on pulp strength, uniformity, and bleachibility. The liquor producing equipment was not sufficient to provide more than 5300 pounds active alkali per cook. This led to the use of increased total volume whereby maximum uniformity could be obtained with a minimum sacrifice in strength by further dilution of the active alkali.

From the results of these cooks, a compromise digester liquor charge, based on Cook No. 3, was effected at a total liquid volume and white liquor concentration that would meet the convenient requirements of the mill conditions. Sufficient proof was shown that in this charge improved bleachibility could be obtained while at the same time retaining sufficient strength.

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Tramp Iron Problems In the Paper Industry

R. F. Merwin and R. C. Hoff,
Erie Mfg. Co., Erie, Pa.

Returns from a questionnaire recently received from 178 key operating and engineering personnel in the paper industry reveal that tramp iron has contributed to a costly shutdown in the experience of exactly 50 per cent of those surveyed. In addition to loss of income due to shutdowns, it was definitely established that foreign metals is costing the paper industry several million dollars a year additional as the result of damage to chippers, hogs, valves and pumps, beaters, pulpers, jordans, refiners, fourdriniers.

On examination, a typical collection of tramp iron causing this damage consists of wedges, spikes, links of chain, conveyor flights, wires, tie buckles, nails, bolts, pipe nipples, tools, pieces of welding rod, bottle caps, large pieces of scale and small wire staples. One box board mill actually removed a Ford engine block from its beater.

The tramp iron problem is more critical today than it was 20 years ago, due to the fact that such vast progress has been made in the replacement of men by automatic conveying and process machinery. This means that more stray metal is entering process lines as a result of less manual inspection. Furthermore, as we use more mechanized equipment, *more* steel conveyor and machinery parts and fastenings inevitably break or wear away, and the survey reveals these parts frequently reach a vulnerable piece of equipment.

Unfortunately, there is no *single* answer to this rather complex problem. In some operations riffle boxes, settling tanks and Vortraps, etc. can be utilized to greatly reduce the foreign contamination. This paper deals solely with the most serious and costly of the foreign material problems—mainly tramp iron and the use of magnetic separators as a solution to the problem.

While magnets do not attract the non-ferrous metals such as brass, copper and aluminum, it is generally conceded that of foreign metal problems in processing plants, only 1 to 2 per cent of tramp metals are non-magnetic—and because these are usually softer metals, they do not cause the damage to vulnerable processing equipment that the harder steels do.

Only the more progressive of the design engineers have recognized the seriousness of the problem caused by the increasing amount of tramp iron traveling in processing lines and are designing adequate magnetic protection in to the original plans. However, an increasing number of plants are realizing real savings by providing tramp iron protection for chippers, pumps, defibrators, mills and fourdriniers. Coal-burning power plants have long recognized how much damage a railroad spike in the coal can cause to conveyors, stokers and pulverizers and use magnetic protection, but only 41 per cent of those replying to the questionnaire stated they were using magnetic separators in pulp and paper lines. And a large percentage of those mills without magnets stated tramp iron contributed to shutdowns.

Properly designed and positioned magnetic separators can solve virtually every serious tramp iron problem that exists in paper processing today. In fact, 68 per cent of those reporting on the effectiveness of their magnetic separators stated they were operating at an efficiency of 90 per cent or better. This is a remarkable figure in view of the fact that many magnets of inadequate strength and capacity have been installed without serious consideration having been given to all major factors which contributed toward maximum effectiveness. In the paper industry these major factors include volume and velocity of material flow, density and consistency of material, physical limitations, and in the case of closed systems, the pressure involved at point of installation.

Theory and practice

In theory, the remedy for a tramp iron problem in the paper industry is relatively simple. Tramp iron causes trouble; magnet catches tramp iron; install magnet and eliminate trouble.

In practice, however, the solution can be complicated by many conditions that affect the efficiency with which ferrous contamination can be removed from wood chips or paper slurry. For example, a magnetic pulley installed at the end of a belt conveyor traveling 125 feet per minute and carrying a 4-inch burden of wood chips will probably never permit a piece of tramp iron to pass. However, if that belt is traveling at 400 feet per minute with a 6-inch burden depth of wood chips, the same pulley would likely be less than 75 per cent effective. In the latter case, the horizontal momentum is too

great for the magnet to always remove the iron. The problem becomes more difficult when it is desirable to remove a magnetic object the size of a tack from a 5 per cent paper slurry traveling under pressure. Factors such as volume and velocity of slurry, size of iron to be separated, desirability of automatic cleaning, all form part of the equation used to determine the type and strength separator required.

This leads to an obvious conclusion—it is highly desirable to procure the recommendations of a magnetic separation specialist in the solution of specific requirements for a paper processing application. Magnetic separators are not something that can be purchased "off the shelf" in the paper industry.

Prior to 1945, all magnets installed in the paper industry were electrically energized; however, since the development of Alnico, a powerful new magnetic alloy which holds its magnetic strength indefinitely, today more than two-thirds of the magnetic separator installations in the paper industry incorporate permanent magnets. Not only can permanent magnetic separators be tailored to fit specific applications, but also they do not need motor generator sets or rectifiers, electrical wiring, require no outside source of power to energize, and never weaken or burn out as do electro units when subject to wet conditions in the paper industry.

Four categories

Basically, magnetic separators can be divided into four specific categories:

(*1*) *Magnetic Pulley*—This device automatically separates tramp iron from non-magnetic materials such as wood chips and coal conveyed on belts. As contaminated material reaches the pulley, a powerful magnetic field which penetrates both the belt and the bed of material attracts and holds to the belt all undesirable iron and steel. The clean product, being non-magnetic, falls off the pulley at the natural tangent point.

The magnetic tramp iron is held to the belt until carried past a divider and out of the magnetic field. It then drops into a bin, chute or whatever is desired. The pulley will work efficiently with belts of rubber, canvas or other non-magnetic materials.

(*2*) *Magnetic Drum*—A separator that is similar in principle to the magnetic pulley is the magnetic drum. It can be installed in any conveying system that does not use belts and automatically removes ferrous contamination from both wet or dry materials, depending on where and how it is installed.

The magnetic drum separator consists of a revolving stainless steel cylindrical shell within which a stationary, high-powered, non-electric magnet is located. In the case of paper slurry, the material flows against the stationary magnetic field, and ferrous particles adhere to the shell's surface. As the shell revolves, it carries the magnetic material up out of the flow, where the contamination is automatically removed by means of a scraper.

(*3*) *Plate Type Magnets*—Many hundreds of permanent plate type magnets are installed in strategic locations in paper processing operations. The most common non-electric industrial magnetic separator consists of a series of Alnico magnet castings mounted on magnetic stainless steel plates. These are surrounded by strips of non-magnetic stainless steel which prevent the leakage of magnetic lines of force to surrounding iron or steel. The better designated plates incorporate a protective stainless steel cover to protect magnet castings from tampering by workmen and from unwanted accumulation. Frequently they are completely submerged in the slurry and will effectively remove tramp iron under water without loss of magnetic strength for indefinite periods of time. (The FBI and state police utilize the same piece of equipment to retrieve murder weapons at the bottom of a lake or river.)

(*4*) *Magnetic Humps or Traps*—The paper industry has demanded and has had built for it magnetic humps and traps—packaged units built to withstand pressures, incorporating powerful liquid-tight magnetic plates. Properly installed, these devices are virtually eliminating serious tramp iron damage to pumps, jordans and refiners, and saving users hundreds of dollars per year not only in machinery damage, but down time.

Since to date it has been impractical to incorporate a self-cleaning magnetic separator which will operate under pressure, magnetic humps, traps and plates must be opened and tramp iron manually removed. A by-pass line can be incorporated when it is necessary to clean without shutting down the line.

One New York State mill, after installing two magnetic humps (which are cleaned once a week) estimated the savings in damage to machinery at over $50,000 per year. Incorporated in this figure is not only lost production and the man hours involved in the repair, but the cost of fillers which were being constantly damaged in their jordans.

All four types of equipment can be built with adequate physical and magnetic capacity to solve even difficult tramp iron problems.

Many mills have incorporated non-electric magnetic humps in the pressure line immediately ahead of jordans and refiners. Plate-type magnets in head boxes are saving many mills hundreds of dollars a year in the elimination of machinery damage, and at the same time slightly improving quality of the finished paper. In addition to tramp iron, magnets usually remove a percentage of the rustscale and fine iron contamination that flows in processing lines.

What Is Wrong with Paperboard

Peter R. Scott, field superintendent, C. B. Cottrell & Sons Co., Westerly, R. I.

Printing multi-color folding boxes by the rotary, wet letterpress method employs printing presses of the same type that is used for multi-color pages and covers of fancy catalog and publication work. *National Geographic, McCall's, Esquire,* etc. are good examples of such work.

A magazine-type press, introduced by the firm with which I am associated, is the first and only rotary that has been redesigned to handle boxboard. The new design was necessary in order to meet the complexity of conditions present in high speed printing of such paper, as contrasted with most other types of paper.

Because of the numerous and short cycles involved, from separating a sheet of boxboard to delivering it flat and accurately, all printed in five colors, new devices had to be made, and existing ones had to be strengthened to guarantee the accuracy needed in the printed product.

Of course, these changes and others contemplated are helping to increase running speeds and net production in plants using ultra-modern equipment, but basic quality of boxboard concerning uniformity and elimination of certain variables are absolutely essential to obtain the real potential of such high production equipment. In cases where such quality improvement has been seriously followed up, phenomenal results are being obtained.

The boxboard press is made in two-color, three-color and five-color models, taking a

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English China Clays Sales Corporation
551 Fifth Avenue, New York City

maximum sheet up to 48 by 71 inches. The five-color model is proving to be the most used and, therefore, the one to be discussed here. A press of this type can handle boxboard up to 0.030 inches (30 points) thick in five colors of highest quality in a single pass. It will run at speeds up to 5,000 sheets per hour. This production means that a sheet of paperboard weighing about 1½ pounds is lifted from a pile by vacuum and passed through the press, printed in five colors, and delivered onto another pile uniformly at a rate of approximately ⅝ of a second per sheet.

The initial investment for a press of this type would be approximately $180,000. This investment, plus the operating cost, makes the continuous operation of the press important. The value of a sheet of paperboard also greatly increases after it has been printed, so it is important that the sheets are not damaged while being run through the press. When a press stands idle because of damage to plates and packing, or for other reasons, there is considerable monetary loss due to downtime, plus the actual loss of production.

Scrap in piles causes damage

I believe the No. 1 headache on a press running paperboard is the scrap found in the piles. On a press of this type, it is necessary to turn over all stock and re-pile. In this way, some of the scrap is found; but it is surprising how much is missed. This scrap can be anything from a piece of board ½ inch square or long narrow strips, up to large sections of sheets. When this scrap passes into the press, it not only damages plates, but also the packing. In some cases, it will keep a press "down" for a long period of time until new plates are procured.

The press is equipped with "detectors" to try to catch any scrap going through, but it seems as if it is just impossible to catch it all. In some cases, there are as many as six detectors across the sheet.

When we depend on a detecting device to locate this scrap, we again face the possibility of trouble because of thickness variations in the board. These sheets are fed into the press in a stream—one sheet overlapping the other. Because of this overlapping condition and the variation in the board caliper, the detectors have to be set with sufficient clearance to prevent the accumulation of the variation from continually stopping the press. Because of this light setting of the detectors to take care of the caliper variation, I say again that when a piece of scrap comes through we are apt to miss *it*.

When starting up new equipment in a customer's plant, we inquire as to how much the board will vary in thickness. Usually we are told that it will not vary over plus or minus 0.001 inch. When it arrives at the press, however, we sometimes find that the variation, from minimum to maximum, may be as much as 0.008 to 0.009 inch.

As this condition exists in so many plants, we now prepare the press to print even with these variations. This means that, when a sheet is to the plus side, the squeeze on the plates is heavy. This squeeze does not do the plates any good and does not help toward good printing. If such a condition continues throughout the run, the life of the plates is shortened; and, of course, the quality of the printed work will not be up to standard.

Hard spots in paperboard

Our next hidden hazard is the hard spots in paperboard. During the month of February (1952) we started up a press in a plant where the board had been purchased from another company. Every report I received from our press erector during the start-up read the same: "waiting for *plates* damaged because of hard spots in the cardboard." These spots varied from the size of a pea to the size of a half dollar. In some cases, they were much more than twice the thickness of the board being run. This condition not only caused downtime, but was very costly to the customer. Damaged plates had to be replaced, also the packing; and then, too, there was the additional expense of extra men who were on the job at the time of starting-up.

On a press in another plant we were running along one day when a metal washer appeared—bedded in one of the plates. This washer was traced to a sheet of paperboard.

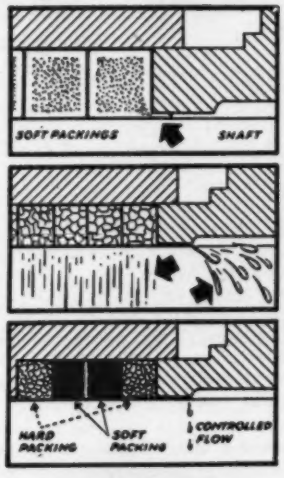
Poor cutting and slitting

We also have some trouble with sheets that are trimmed short. This condition stops the press, since the sheets do not arrive at the intake cylinder properly. In line with the press delay caused by short sheets is the side registering of sheets slit on the bias.

..try JOHN CRANE

Combination Sets

In the majority of cases, no one type of packing is 100% efficient. Therefore, "John Crane" recommends COMBINATION SETS to assure proper sealing. Here's why:



Straight soft packing used throughout permits end rings to squeeze into gland and throat clearances, thus sealing off the required amount of leakage needed to serve as lubricating film between shaft and packing.

Straight hard packing used throughout often is not sufficiently sensitive to gland pressure to control leakage within the desired limits. Also, the use of this single type of packing may result in scoring the shaft.

The right combination, however, of two types of "John Crane" packing offers better sealing, increased shaft life and less down-time in a variety of services. That's because soft inner rings are employed to provide a positive seal—yet allow Controlled Flow Lubrication, while harder end rings serve as a dam to stop inner ring extrusion.

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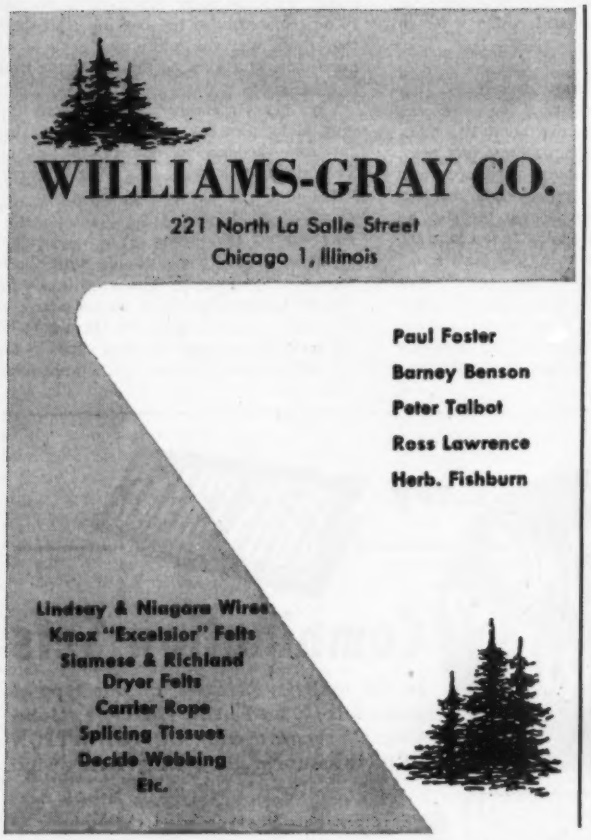

A Sight-Flow Indicator

that Really Works

The Midwest Ball Sight-Flow is the one and only dryer condensate indicator with a "Window" that really stays clear—is constantly being scoured and kept clean by the violence of the liquid as it passes. The thousands already in use on both wet and dry end dryers prove that statement.

Flow visible from front and both sides. Installation in discharge line either vertical or horizontal.

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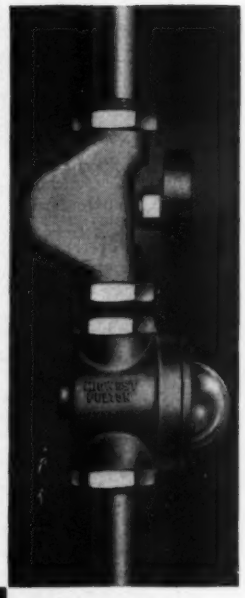


Midwest-Fulton Machine Company Dayton • Ohio

These sheets will run out of square as much as ⅛ inch to the foot. Some of the edges are concave and some convex. Another serious condition is poor slitting on the guide edges. At times, these edges have the appearance of being squeezed apart, rather than being clean cut. This gives a sort of feather edge which, when registering the printed matter on the sheets, will vary in its location. Referred to as poor side guiding, it can not be helped because of the ragged condition on the edge of the board.

Curled stock

We are often asked why the press will not run stock that is curled. May I quote an engineer from one of the leading feeder companies during a visit to one of the large boxboard converting plants: "The writer made some study of your piles and noticed instances where pile conditions were definitely detrimental to high speed operation. Where stock had a tendency to curl down, a short skid only increased this curl. Bad dents in these same piles made even slow operation questionable. While we realize that all piles are not perfect, we must face the fact that a flat, even pile will allow higher operating speeds and that increased attention to these stock conditions is a major factor in running speeds."

Trouble from change in furnish

A short time ago, one of our servicemen was sent to a plant where considerable trouble was being experienced in printing paperboard. It turned out that the job in question required 100 tons of board. As this board was being run in a small mill, it was found that the mill had to change its formula about three-quarters of the way through the run because of certain furnish shortages. In this particular case, the printer had trouble running the board. The ink did not print the same; the plates just would not register. When the texture of the board is changed this way and the durometer is changed either to softer or harder board, it means starting all over on the press and having the inks made differently. These changes become very costly, so most printers just worry through the job at slower speeds and sacrifice quality.

Variations that affect register

We sometimes receive calls that a press is not registering its colors properly; and we travel considerable distances only to find that, regardless of what press the board is run on, we get the same result. Close examination reveals that the board varies in color, and some sections of the load look damper than others—not different loads, but variations in the same load. The cause of this condition is a mystery; the fact that it exists is a headache.

In short, it is a certainty that high speed, efficient printing, with ever-increasing quality demands requires every bit of ingenuity on the part of board mill operators to improve quality and, particularly, to meet some of the conditions just related. This attack, together with continuous engineering improvement of existing devices and the future invention of improved devices and processes, is, and must be, our mutual aim.

New Products Briefs . . .

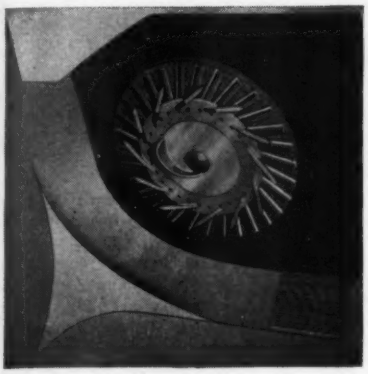
VACUUM—A new "big brother" to the Hild heavy-duty portable vacuum is now available. The new model wet-and-dry industrial vacuum is made with a 55-gallon tank which holds 5 bushels of dry dirt or 40 gallons of recovered liquid. *Hild Floor Machine Co., 740 W. Washington Blvd., Chicago 6, Ill.*

CONCRETE SEALER—"Concrete Glaze" is a fast-drying, clear varnish for use on concrete floors and other concrete surfaces where hand trucks, heavy drums, or material handling units create a dust problem because of their abrading action. It is resistant to acids, alkalis, grease, oil, water, and steam and can be used on both exterior and interior surfaces. *Rex Home Supply Co.,142 S. Highland Ave., Ossining, N.Y.*

METAL PROTECTIVE COATING—Dum Dum for metal, latest product of the 40-year-old Dum Dum line is almost completely resistant to creep corrosion. It has the ability to "heal itself" where the surface of the coating is ruptured and has sufficient lasting pliability under the surface to bridge expansion cracks and expansion joints. *The Arco Co., Dept. DMI, 7301 Bessemer Ave., Cleveland 27, Ohio.*

LENS TISSUE—Designed for keeping safety goggles clean and polished, this silicone treated lens tissue removes smears, dirt, lint and dust. It leaves an invisible coating of silicone on lenses which protects them. *General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32, Pa.*

The Paper Industry New Products



Pulper-Refiner

The "Beatapulper," a new unit that pulps, defibers and refines paper stock all in one operation, features an action that lends itself to the complete treatment of mixed furnishes. The dispersing action of the impeller, plus beating action of the knives, permits chemical treatment, size, alum and color to be added at any time during the batch cycle.

Fibers are selectively picked up by an advancing knife edge and brought into mechanical contact with a stationary bedplate or refining disc. The knives, made of forged steel with a Haynes Alloy leading edge, are streamlined to maintain a self-sharpening edge and to minimize hydraulic losses.

The bedplate or refining disc is constructed of heavy steel and has radial grooves 3/16 in. wide and ¼ in. deep. These grooves are kept full of moving stock, and anything small enough to get into the grooves is sheared off by the knife. Trash too large to enter the grooves is pushed away by the impeller and knives.

The "Beatapulper" is designed so that pressure between the knives and bedplate can be varied by means of a regulating valve in the cylinder supply line. The entire assembly is mounted on a heavy back plate and bolted to the pulper tub. A control panel is available containing a recording pressure gauge and recording ammeter, together with a convenient means for adjusting the bedplate pressure against the knives. The position of the bedplate may also be changed from one of engagement with the knives to a free running position where there is no contact between the bedplate and the knives. A standing height desk with drawer for records is mounted on the front of the panel. *Cowles Co., Inc., Cayuga, N.Y.*

Fire extinguisher

Fighting fires at the molecular level by diluting the active ingredients of flame, the new automatic ProtectoSpray quickly extinguishes fires. When used in place of standard automatic sprinklers for special hazard protection, it is claimed to reduce ceiling scorching and check fire spread with 30 per cent less water.

The heat from a fire normally raises the temperature of nearby flammable material to its distillation and ignition temperatures. The automatic ProtectoSpray diverts this heat to vaporize water droplets. This removal of heat checks the spread of fire and the resulting water vapor dilutes the flame gases to that they cannot burn. This fire extinguisher produces a wide range of water droplet sizes, small ones to produce water vapor and larger ones to wet and cool the burning material. It is approved by both the Factory Mutual Laboratories and the Underwriters Laboratories. *Grinnell Co., Inc., 200 W. Exchange St., Providence 1, R. I.*

Speed reducer

A new double reduction shaft-mounted speed reducer with capacity to 43 hp, and for output speeds from 12 to 110 rpm, has recently been developed. This new No. 7 reducer increases the applications for Dodge Torque-Arm speed reducers. It has 59 per cent greater horsepower capacity than the No. 6. The new Tri-Matic overload release is applicable to the No. 7 speed reducers. *Dodge Mfg. Corp., Mishawaka, Ind.*

Circular chart controller

An electronically operated circular chart controller which can control industrial processes according to time-temperature schedules has recently been developed.

In instances where both time and temperature control are important for product quality and efficiency of operation, the new instrument has an integral-program mechanism which automatically positions the instrument control point in accordance with a predetermined program.

This controller combines within a single case, measurement and recording on a 12-in. chart; automatic positioning of the set point index as directed by a transparent program cam; and automatic program control of the variable.

The standard Brown Continuous Balance system, available in both electric and pneumatic control, is used for measurement. An adjustable micro switch assembly, operated by the cam, is optional. It is used to de-energize the cam drive motor, shut down equipment, operate signal lights or perform other electrical functions. *Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Aves., Philadelphia 44, Pa.*

Magnetic brake

A new magnetic brake design that eliminates all levers and linkage found in conventional units has been developed. This new brake contains only six major operating parts and features a direct, automatic set and release action between the solenoid and armature.

The solenoid is of a one-piece "doughnut" design that permits the motor's output shaft to extend completely through the brake. This permits the user to utilize both ends of the motor shaft for powering two pieces of equipment when desired.

These magnetic brakes are also suited to fluid coupled motors and gear reducers because of this feature. The brake is installed on the output shaft of the fluid coupling with the shaft extending through the brake for hook-up to the load. Other features include: light weight, automatic lining wear adjustment, quick action, automatic operation, manual release and automatic re-set, and simple disassembly. *Reuland Electric Co., Alhambra, Calif.*

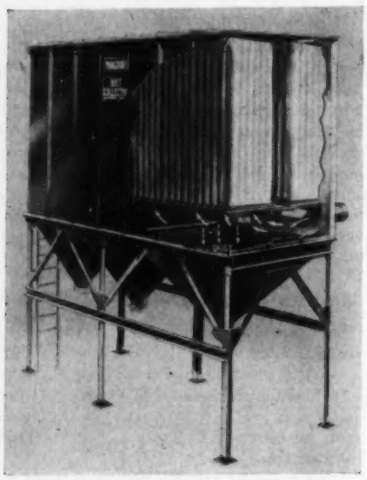
Vibrator

A new and larger vibrator has been added to the patented Peterson "Vibrolator" line. The new model, specified as the DV 51, is designed to tackle the feeding problems that

arise when larger hoppers and bins are necessary in materials handling.

The DV 51 gives a powerful all-directional vibration that effectively moves materials without damage to the faces of hoppers or bins. It has a two-inch ball that weighs 1 lb.—an increase of 66 per cent from the largest model previously manufactured. Operation is based on the same principle as other Peterson "Vibrolators."

The new vibrator is easily installed and requires practically no maintenance. It is instantly self-starting, quiet in operation and requires no lubrication. *Martin Engineering Co., Kewanee, Ill.*



Dust collector

A new cloth-bag collector for dusts such as carbon black, cork, fine wood, graphite, pigments, lime, metal oxides and other dusts with similar characteristics is now being offered. Simplified design of filter bags and mechanism for reclaiming dust from the bags, provides dust control at low equipment and installation cost.

These dust collectors range from 5 to 40 ft. long, contain 1,360 to 10,880 sq. ft. of filter cloth, employ from one to six hoppers, and are supplied with the appropriate structural supports to furnish the type of disposal desired. Minimum number of parts, simplified design, and easy accessibility provided by a walk-way between the bags make it possible to maintain and inspect the collector easily and without tools. *Pangborn Corp., Hagerstown, Md.*

Viscometers

Several new models have been added to the 1952 line of Brookfield Synchro-Lectric viscometers. Also, all standard models have a number of new features. In addition to a new eight-speed model and a new modified four-speed model, the new line includes 10 other single and four-speed models, available in various rpm's up to 600.

All models are portable and feature a new bubble level permanently attached to the instrument for proper leveling, either in a laboratory stand or when making point-of-process determinations. Another feature is that any standard model now may be secured with explosion-proof construction if desired.

Each new viscometer is accompanied by a complete set of suitable spindles, a spindle holder, and a compact carrying case which can contain both the viscometer and the spindle holder. *Brookfield Engineering Laboratories, Inc., Porter St., Stoughton, Mass.*

Cable

Pneumatic and hydraulic control circuits may now be streamlined through the use of Armortube cable, a flexible, protected multitube transmission line. This cable is made up of ¼-in. O.D. aluminum or copper tubing gathered in a slow continuous spiral similar to the construction of rope. A tube bundle is first wrapped in water-repellent insulating tape and then encased in heavy rust-resistant, galvanized steel strip like that used for BX electrical cable.

Available in bundles of 4, 8 and 12 tubes, this cable is capable of transmitting hydraulic control pressures as high as 3000 psig. and all ranges of pneumatic control pressures. A tracer tube easily identifies corresponding tube ends between cable connecting points, since all tubes in a bundle maintain the same position relationship. *Bailey Meter Co., 1022 Ivanhoe Rd., Cleveland, Ohio.*

New Products Briefs . . .

MOTORS—The new Form G line of G-E fractional-horsepower motors incorporates many radically different and advanced design features. The new motor weighs as much as 51 per cent less per horsepower than the models it replaces, is considerably smaller in size, and has increased usability and improved appearance. *General Electric Co., Schenectady 5, N.Y.*

GRINDING WHEEL MOUNT—A revolutionary new mounting for portable tool wheels and tool and cutter wheels dampens vibrations and gives better finishes to almost any grinding job, eliminating the necessity of changing the wheel to obtain a smoother finish. *Chicago Wheel & Mfg. Co., 100 S. Aberdeen St., Chicago 7, Ill.*

VARIABLE SPEED DRIVE—Type KFEA variable speed units with single reduction gears in ratings of 20 and 25 hp are now available. They are manufactured in speeds of 728 rpm and lower, with infinite speed adjustment within the ranges of 2:1, 3:1 or 4:1. *Sterling Electric Motors, Inc., 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.*

HAND LAMP—The new low-priced sealed beam Model No. 166 portable electric hand lamp is the latest addition to the Big Beam line. Its hermetically sealed beam bulb seals out dirt and moisture from the mirrored surface of the reflector and gives brilliant prefocused light. *U-C Lite Mfg. Co., 1050 W. Hubbard St., Chicago 22, Ill.*

FLOOR RESURFACER—A new floor patching material called Permamix can be used on any present type flooring and is ready for instant use, indoors or out, just as it comes from the container. It sets instantly, so traffic can be resumed immediately. *Permamix Corp., 228 N. La Salle St., Chicago, Ill.*

DUCT BOOSTER FAN—A new heavy-duty belt driven fan, with motor outside of air stream, for use in paint spray booths, large range hood exhausters, or in ventilating or heating systems is recommended for air movement up to 350 F. It is relatively quiet and will operate against moderate static pressure up to 2 inches. *Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, N.J.*

INDUSTRIAL INSTRUMENT PEN—This new pen has a removable tip and a new reservoir construction which eliminates flooding because the effective ink level is always below the writing tip. It also reduces paper plugging and choking because it operates with decreased pressure on the instrument chart. The new design fits on standard pen carriages. *Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Aves., Philadelphia 44, Pa.*

PLASTIC RESINS—A new series of water-soluble, modified polymer plastic resins known as Lustrex X-700, recently introduced to the market, are useful as paper coatings and in numerous other applications. These resins have high heat resistance, nonthermoplasticity and resistance to chemicals, oils and solvents. *Monsanto Chemical Co., Plastics Div., Springfield, Mass.*

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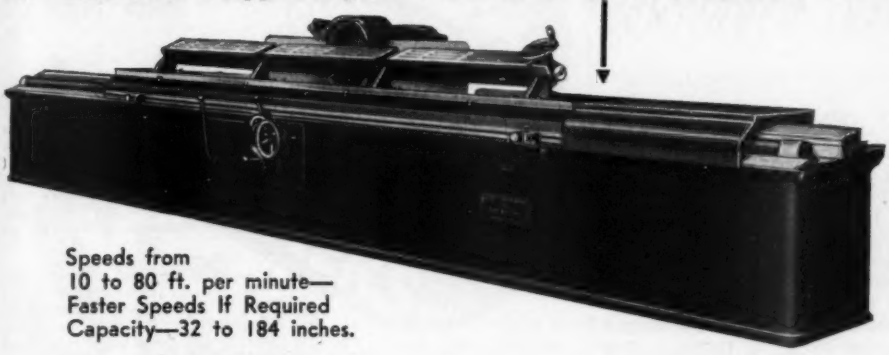

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The Paper Industry New Literature

Books

CHEMICAL ENGINEERS' HANDBOOK. Third Edition. John H. Perry, Editor. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. 1942 pages. 7½ x 10. $17.00.

The third edition of this handbook has been thoroughly revised and enlarged, presenting the most authoritative and latest information on the theory and practice of chemical engineering. In addition to covering the field of chemical engineering, including facts, figures, methods and data, this handbook also deals with related fields.

The book is divided into 30 large sections containing material from 141 contributors, each a specialist in some phase of chemical engineering. The progress in the field of chemical engineering during the past decade has been so great that most of the sections have either been completely rewritten or fully revised. Formulas, equations, charts, tables, schematic diagrams, etc., cover a wide range of topics from flow of fluids, gas absorption and mechanical separations to process control, furnaces and kilns and plant location. All the illustrations have been newly prepared, increasing their legibility.

Completely new sections which have been added to this edition include: General Theory of Diffusional Operations; Furnaces and Kilns; Size Enlargement; Azeotropic Distillation; Multi-component Distillation; Extractive Distillation; Molecular Distillation, and Dialysis.

CONSERVATION YEARBOOK FOR 1952. Edited by Erle Kauffman. Published by Conservation Yearbook, 26 Enterprise Bldg., 1740 K St., N.W., Washington 6, D.C., 288 pages. $5.00.

A standard reference guide and directory to facts, figures and people in American conservation, this yearbook is divided into six parts: The Land and its Use; Soil and Water; Forests and Forest Products; Wildlife and Fisheries; Parks and Wilderness and Miscellaneous.

Included in this volume is a directory of more than 400 conservation agencies, commissions, boards, associations, foundations, societies and other organizations; a guide to key men and women in resource planning and management, with more than 5,000 names, titles and addresses; a complete listing of the 2,300 soil conservation districts in the United States, with the acreage, number of farms involved, and address of the executive officer of each district, in addition to a full roster of national and state forests and parks and national wildlife refuges, with essential facts, names and addresses; and approximately 100 pages of tables presenting current facts and figures on a wide range of subjects from the per acre cost of forest fire protection in each state to the irrigable acreage, power capacity and ultimate cost of reclamation projects in operation, under construction, or authorized.

THE PAPER YEAR BOOK FOR 1952. Edited by Frank Dysarz. Published by Davidson Publishing Co., 405 E. Superior St., Duluth 2, Minn. 644 pages. 8½ x 11½. $10.00.

The tenth annual edition of the Yearbook represents a complete revision, with the addition of many new products and new information reflecting all of the changes that have been made in paper and related products during the last 12 months.

This new book presents complete and detailed information on more than 1,000 papers, paper products and related items closely associated with the paper industry. Included are over 700 photographs and over 100 useful charts and tables. It is made up in nine major sections, thumb-indexed for easy reference. The presentation covers not only the products of the paper industry but markets, uses, and other information prepared for both buyers and sellers of paper.

PULP AND PAPER, CHEMISTRY AND Chemical Technology. Vol II. By James P. Casey. Published by Inter-science Publishers, Inc., 250 Fifth Ave., New York 1, N.Y. 608 pages. 6¼ x 9¼. $15.00.

Volume I of this book was concerned with the chemistry of the basic pulp and papermaking operations. The properties of paper and the important paper-converting operations are discussed in this volume. Topics covered in the eight chapters of this book are: the physical, optical, chemical, electrical, and microscopical properties of paper; the use of statistics in the paper industry; pigment coating; printing; laminating and pasting; internal treatment of paper with resinous materials, including the treatment of paper with latices and emulsions, saturation of paper (with asphalt, oils and waxes), and a section on paper plastics; coating with resinous materials, and resins. Photographs, diagrams and tables are included.

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, The Paper Industry lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.

Filters. General American Transportation Corp., Process Equipment Div., 135 S. LaSalle St., Chicago 90, Ill.—This 20-page booklet presents detailed information about fabricating facilities, filter type selection, the Conkey rotary drum vacuum filter, solvent dewaxing filter for the refinery, sludge filter, rotary disc vacuum filter, rotary hopper vacuum dewaterer, rotary leaf pressure filter, and auxiliary equipment for filters. Included is information about applications, operation, construction, auxiliary equipment and standard sizes of these various filters. Many photographs, diagrams, and tables are given.

Rotary Lime Kiln Control. Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Wayne & Windrim Aves., Philadelphia 44, Pa.—Data Sheet 29.4-1 describes benefits to be gained from the custom-engineered application of instrumentation to rotary lime kilns. Included in this 4-page sheet are a typical application drawing and an installation photograph of a custom-engineered control cubicle.

Magnetic Tools. Multifinish Mfg. Co., Magnetool Div., Dept. 477, 2114 Monroe, Detroit 7, Mich.—M-30, a new catalogue piece, presents illustrations, specifications and prices of sixteen standard, hand-operated permanent-magnet tools. Designed to be a file reference for the tool buyer, master mechanic, plant engineer and superintendent, it is condensed to four letter-size pages.

Paper Coating. The Dow Chemical Co., Midland, Mich.—This technical data bulletin on the use of Dow Latex 512-K paper coating formulations on size press equipment contains complete information on the properties of the latex and data on how these size press formulations allow the production of a new line of coated papers without the addition of special equipment.

Lighting Maintenance. Sylvania Electric Products Inc., Lighting Div., 60 Boston St., Salem, Mass.—This new 12-page bulletin, "The Why, When and How of Modern Lighting Maintenance," includes an 8-step program of planned fluorescent lighting maintenance, in addition to other useful information.

Resin Emulsions. Hercules Powder Co., Wilmington, Del.—Revised information about a series of resin emulsions containing 40 to 45 per cent solids is contained in this 4-page leaflet entitled "Dresinol."

Paper Testing. Thwing-Albert Instrument Co., Penn St. and Pulaski Ave., Philadelphia 44, Pa.—Leaflet P-500 presents a photograph and brief description of numerous paper testing instruments.

Power Piping. Taylor Forge & Pipe Works, P. O. Box 485, Chicago 90, Ill.—This 6-page bulletin, 515A, is a reprint of the article, "How to Use Schedule Numbers in Power Piping Design," by Sabin Crocker. The relation of the schedule number system to code formulas for determining the wall thickness of power piping is explained. Two charts for selecting pipe wall thickness are included.

Combustion Control. Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio—A detailed account of automatic combustion control techniques for oil and gas fired boilers is available in this 24-page bulletin (No. 1023). Illustrations and descriptions include diagrammatics showing nine typical firing methods and 16 major control equipment components. There are also individual facts and figures on 300 installations throughout the United States.

Pumping Motors. Electric Machinery Mfg. Co., Minneapolis 13, Minn.—This 24-page booklet, Synchroniser No. 34, features the

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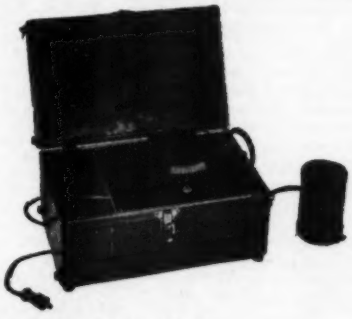

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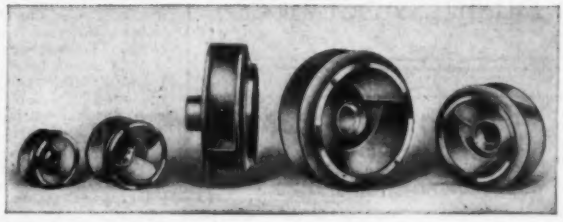

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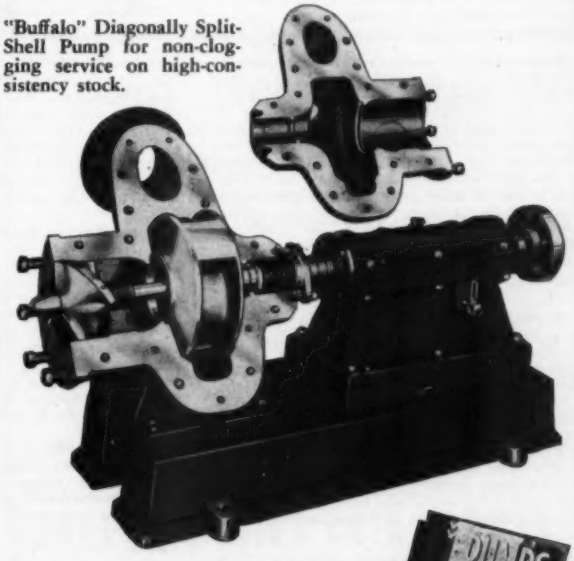

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story of how the world's biggest motors for oil pipe line pumping were designed and built. Another section is devoted to cement manufacturing. Other articles include the processing of raw cotton, the selection of large a-c motor control, and an explanation of a new magnetic drive speed control.

Potentiometers and Bridge Instruments. The Bristol Co., Waterbury 20, Conn.—This 36-page bulletin, No. P1245, describes Bristol's line of Dynamaster electronic potentiometers and bridge instruments for industrial plant, pilot plant, process, research and laboratory use. It is illustrated with photos of the basic electronic components of instruments and of the various models offered, as well as reproductions of charts and wiring diagrams showing principle of operation. Photographs of several interesting new applications of these instruments are also included.

Centrifugal Pumps. Allis-Chalmers Mfg. Co., 991 S. 70th St., Milwaukee, Wis.—The 48-page booklet, 08X7780, covers the installation, operation and repair of single-stage, single-suction centrifugal pumps, while the 24-page booklet, 08X7813, covers the operation, installation and repair of multi-stage centrifugal pumps. Section drawings are of a large size for easy reference. Each booklet has a page on which the user can keep a maintenance record of his pump and a handy reference table explaining how to locate trouble and listing possible causes and cures.

Welding Alloy. Eutectic Welding Alloys Corp., Dept. P, 172nd St. and Northern Blvd., Flushing 58, N.Y.—This new leaflet features case histories of savings in production and maintenance through the use of "EuteeTrode 27," a new non-critical (no nickel) electrode for all types of cast iron or cast iron to steel structures. It contains photographs of applications, in addition to technical data on applications, physical properties, etc.

Dust Control. Pangborn Corp., Hagerstown, Md.—"The Control of Industrial Dust" is the title of this new 28-page bulletin, No. 909A. Pangborn dust control and its many applications are described. Case histories of users of this equipment are documented with photographs and performance data. Featured is the "CH" system of control. All elements of the system are described and illustrated. Specifications on sizes and dimensions of Pangborn equipment are listed, as well as construction details. Application and engineering data are tabulated according to types of dust and collection requirements.

Controllers. The Foxboro Co., 26 Neponset Ave., Foxboro, Mass.—Eight types of the Model 40 controller are described in this new 32-page bulletin, 461, which contains 114 illustrations and diagrams. Each instrument is pictured with a typical process diagram and a characteristic chart record. One section describes the five types of control action available with the Model 40. Control mechanisms for each type are diagrammed and explained. Methods of selecting the proper control action by analyzing the needs of the process are covered in detail. Also included are specifications, controller air-connections, case dimensions, measuring elements, safety shutdown systems, and other features.

Papermaking and Converting Machinery. Shartle Bros. Machine Co., Middletown, Ohio.—Stock preparatory, paper forming, and paper converting machinery are illustrated and briefly described in the 12-page bulletin, No. 6-BC.

Mixers. Process Industries Engineers, Inc., Pittsburgh, Pa.—Bulletin No. 52A, containing 8 pages, describes and illustrates the new Pie-Flex mixer with detached motor coupled to mixer by flexible shaft. A table of motor and propeller sizes for different shaft speeds is given, and typical applications are listed.

Potentiometer Circuits. Minneapolis-Honeywell Regulator Co., Brown Instruments Div., Station 40, Wayne & Windrim Aves., Philadelphia 44, Pa.—Instrumentation Data Sheet 10.0-8 describes the characteristics, applicability, operation and design features of the new narrow span potentiometer circuit for measuring low level potentials. Illustrations showing the external views of the basic circuit and new amplifier and measuring circuit resistor assembly are included.

Edge Position Control. Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.—This 4-page bulletin, No. 141, explains what the Askania edge position control is and how it works, together with drawings which help clarify the explanation. Photographs and a short description of the standard regulator, unit regulator, and power cylinder, three elements of this control, are given.

Plant Maintenance. Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.—How a number of the country's leading industrial plants have effected new efficiencies and marked economies by employing fork-lift trucks and towing tractors in plant maintenance operations is shown in a new 15-minute, black and white, sound motion picture, "Serves You Right." Also featured is the use of industrial radio in the operation of a fork-truck fleet working in both plant maintenance and materials handling activities.

Electrical Maintenance. Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.—A complete maintenance service for electrical apparatus is described in this 24-page booklet, B-4766. It presents a sound maintenance program based on the use of genuine renewal parts, repair service plants, and engineering and field service. Many photographs are included.

Deaerating Heaters. Graver Water Conditioning Co., Dept. 32-6, 216 West 14th St., New York 11, N. Y.—The introductory section of this 12-page bulletin (WC-106) explains the principles of successful deaeration and the essential elements of a deaerating heater. The features of tray-type and spray-tray-type heaters are described in tabular form and illustrated by detailed drawings with identification of all parts. Flow diagrams and photographs of typical heater installations are included.

Concrete Hardener. L. Sonneborn Sons, Dept. P-1, Building Products Div., 80 Eighth Ave., New York 11, N. Y.—Technical Data Guide No. 1, which contains four pages, presents information about Lapidolith, a patented chemical concrete hardener. The leaflet explains what Lapidolith is and how it functions, what it does and will not do, and where and how it is used. A summary of performance test data is given, as well as a chart comparing Lapidolith with other concrete hardening treatments.

Industrial Dryers. C. G. Sargent's Sons Corp., Graniteville, Mass.—This 4-page bulletin, No. 191, presents photographs of the various types of industrial dryers.

Insulation Testing. The John Hewson Co., 106 Water St., New York 5, N. Y.—Copies are now available of articles published originally by Westinghouse Electric Corp. and Consolidated Edison Co. of New York, describing their recommended test procedures and practices using the D.C. method of insulation testing on high voltage electrical apparatus. This includes high speed rotating machinery, cables, transformers, circuit breakers, motors, etc.

Fork Lift Trucks. Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio—A special series of broadsides designed to explain specific points of interest to various groups of individuals concerned with materials handling problems and the use of fork lift trucks is now available. Broadside No. 1 provides detailed and illustrated data on the construction features of Towmotor fork lift trucks, of particular interest to engineers. Broadside No. 2 gives management men the information they may need to weigh equipment costs against performance delivered. Broadside No. 3 is the mechanic's eye view of Towmotor.

Water Treatment. Infilco Inc., Box 5033, Tucson, Ariz.—This new 6-page bulletin (1845) describes the JBAS accelator, a complete package water treatment unit to treat 5 to 100 gallons per minute.

Crushers. Stephens-Adamson Mfg. Co., Aurora, Ill.—Designated as Bulletin 12-C, this new 16-page bulletin covers the S-A complete line of crushers. Capacity and power requirements for all types of crushers are given. Important installation dimensions are tabulated. Photographs and line drawings illustrate numerous installations and explain operating principles.

Paper Reels. Dilts Machine Works, Fulton, N.Y.—The Kohler System paper reels for super calenders are explained in this 8-page bulletin, 7-DM. Various applications are shown in photographs and mechanical drawings. Case histories are quoted.

Unit Load Handling. Baker-Raulang Co., Baker Industrial Truck Div., 1230 W. 80th St., Cleveland 2, Ohio—This 8-page booklet shows how manufacturers, whether they ship their products by company-owned fleets or common carriers, can use the unit load shipping technique to make the most of recent Interstate Commerce Commission decisions which lowered pallet-return rates in the Central States region. Action photos illustrate the unit load system at work.

Steam Generator. Clayton Mfg. Co., El Monte, Calif.—This 12-page booklet describes the automatic, self-contained steam generator. Details are given on specific industrial applications of the equipment. The use of single and multiple installations is described. Application of the forced recirculation principle is demonstrated graphically by means of charts and cutaway drawings. Operational data, showing the application of the steam generator to many industrial processes, is given. Data is supplied on the models and sizes available.

Stainless Steel. The Carpenter Steel Co., Alloy Tube Div., Union, N.J.—A new, four-color segregation chart is designed to help users of stainless steels quickly identify various stainless types. The chart diagrams the stainless type numbers and describes fully how and when to use each of eleven different tests for identifying various stainless types. It also tells how to prepare the samples and describes the procedure for each test.

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Chemists, chem. engineers and laboratory men for paper mills, also for selling and demonstrating; master mechanics, plant engineers, mech. engineers, designers and draftsmen, salary range $5,000 to $10,000; salesmen (several).

Cylinder and fourdrinier mach. foremen; finishing foreman; beater engineers; machine tenders, back tenders and third hands; boss machine tender, machine tender, back tender and third hand for newsprint mill.

Also development engineer familiar with formulation and application of resinous material for surface coating of paper.

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To coordinate activities of design engineering firm and contractors during construction. Direct all engineering and maintenance in completed mill. Should have not less than ten years experience in pulp and paper mill maintenance. Experience in maintenance of sulphate pulp production facilities necessary. Familiarity with groundwood and newsprint production desirable. Summarize experience. Box 537, The Paper Industry.

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To organize Purchasing Department for new mill. Experienced in buying of major equipment and supplies for pulp and paper production. Spare parts and mill stores warehousing experience desirable. Summarize work history. Box 538, The Paper Industry.

FOR SALE—Cameron Camachine Type 8-5, 52″ universal type 2-drum slitter and rewinder, 6″ diameter x 57″ face, cast iron drum; complete with 6 rotary slitters, manual control friction unwind sheave, V-belt drive and 5 hp. motor. Lewis Tar Products Co., P.O. Box A, Lyons, Ill.

WANTED—Graduate chemist or chemical engineer with 2-3 years' experience in paper mill operations desired by large national manufacturer of chemicals for sales service to the paper industry. Address: Box 540, The Paper Industry.

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Lessons in Papermaking—Part 1	1.00
Lessons in Papermaking—Part 2	1.00
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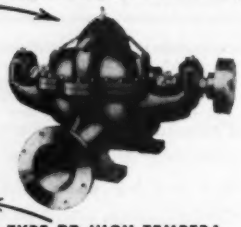

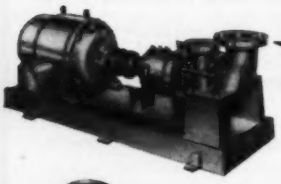

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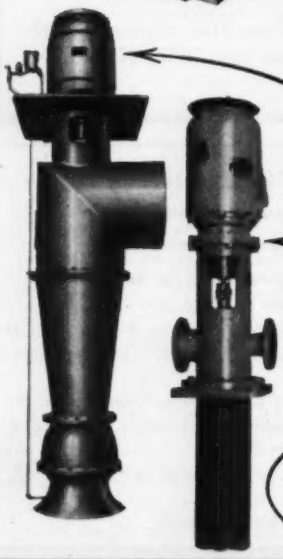

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MARKET QUOTATIONS

RAGS (Domestic)

NEW RAGS

The following are OPS ceiling prices, cents per pound, delivered mills:

	per cwt.
Blue Overalls	14.50
Corduroy	8.00
Washables, No. 1	6.50
Percales	12.50
Light Prints, No. 1	11.50
Khaki Cuttings—	
Sun Tan	11.50
Mixed	8.00
New White Canvas	19.00
Canton Flannels, bleached	21.00
Canton Flannels, unbleached	21.00
Shirt Cuttings—	
New White No. 1	21.00
Silesias No. 1	16.00
New Unbleached	21.00
Fancy	10.00
Linen Cuttings—	
American	14.50
White	21.00
Grey	21.00

Current quotations to mills, f.o.b. New York:

Blue Overalls	12.00 to 12.50
Washables, No. 1	4.75 to 5.00
Light prints, No. 1	8.25 to 8.50
Khaki Cuttings, Mixed	5.00 to 5.50
Canton Flannels, Bleached	14.50 to 15.00
Canton Flannels, Unbleached	14.50 to 15.00
White Shirt Cuttings, No. 1	15.00 to 16.00
Silesias, No. 1	11.00 to 11.50
New Unbleached Muslins	15.50 to 16.50
Fancy Shirt Cuttings	8.00 to 8.50
American Linen Cuttings	12.00 to 12.50

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	1.30 to 1.40
No. 2	.95 to 1.05
No. 3 and 4	.80 to .90
Twos and Blues—	
Repacked	3.00 to 3.25
Thirds and Blues—	
Repacked	2.50 to 2.75
Miscellaneous	2.00 to 2.25
Whites, No. 1—	
Repacked	6.00 to 6.25
Miscellaneous	5.00 to 5.25
White, No. 2—	
Repacked	4.75 to 5.00
Miscellaneous	4.00 to 4.25

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings	Nominal
New Mixed Cuttings	
New Light Silesias	
Light Flannelettes	
Unbleached Cuttings	
New White Cuttings	
New Light Oxfords	
New Light Prints	

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens	Nominal
No. 2 White Linens	
No. 3 White Linens	
No. 4 White Linens	
No. 1 White Cottons	
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Ord. Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
French Blue Cottons	
French Blue Linens	
Checks and Blues	
Linsey Garments	
Dark Cottons	
Old Shoppers	

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	5.50 to 5.75
Domestic	6.00 to 6.25
Wool Tares—	
Light	7.00 to 7.50
Heavy	7.50 to 8.00
No. 1 Scrap Bagging	5.00 to 5.25
Manila Rope—	
No. 1 large	9.00 to 9.50
No. 1 small	8.00 to 8.25
Sisal Rope—	
No. 1 large	7.50 to 8.00
No. 1 small	7.00 to 7.25
New Burlap Cuttings	6.50 to 7.00
Jute Threads—	
Foreign (Nom.)	8.00 to 8.50
Domestic	8.00 to 8.50
Strings—	
No. 1 sisal	6.00 to 6.50
No. 2 sisal	5.50 to 5.75
Soft jute	5.75 to 6.00
Mixed	4.00 to 4.25

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Shavings—	
Hard White Env. Cuts	120.00 to 125.00
Hard White, No. 1	80.00 to 85.00
Soft White, one-cut	70.00 to 75.00
Soft White, No. 1	60.00 to 65.00
Soft White, Misc.	40.00 to 45.00
Fly Leaf, No. 1	22.50 to 25.00
Fly Leaf, Woody No. 1	20.00 to 22.50
No. 2 Mixed Col. Woody	15.00 to 17.50
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	23.00 to 25.00
Mixed Books	16.00 to 18.00
Ledger Stock—	
No. 1 White	42.50 to 45.00
No. 1 Mixed (Colored)	27.50 to 30.00
Manilas—	
New Env. Cuttings	55.00 to 60.00
New Env. Cuts, One-Cut	—
Extra Manilas	22.50 to 25.00
Manila Tab Cards, Free of Ground Wood	65.00 to 70.00
Colored Tab Cards	45.00 to 50.00
Kraft—	
New Envelope Cuttings	55.00 to 60.00
Tripled Sorted No. 1 180#	40.00 to 42.50
No. 1 Old Assorted	27.50 to 30.00
News—	
White Blank	60.00 to 65.00
Overissue	16.00—
No. 1 Folded	8.00—
Old Corrugated Containers	10.00—
New Jute Corrugated Cuts	16.00—
Mill Wrappers	8.00—
Box Board Chips	6.00—
No. 1 Mixed Paper	5.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.55—
Ground, cwt.	4.30—
Powdered, cwt.	4.70—
Blanc Fixe—	
Pulp, bulk, ton	90.00—
Dry, barrels	95.00—
Bleaching Powder—	
Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	27.50—
Argentine, lb.	16.00—
China Clay—	
Domestic Filler Bulk (mine) ton	10.00 to 15.00
Domestic Coating Bulk (mine) ton	15.00 to 25.00
Imported (ship side) Bulk (lump) ton	22.00 to 30.00

MARKET QUOTATIONS

Chlorine—		
Tanks cars (wks) cwt.	2.70—	
Gelatine (silicin), lb.	**1.25 to**	**1.35**
Glyc. (C.P.) drums, lb.	54.25 to	54.75
Litharge, powd. bbl. lb.	.17¾ to	.18¾
Rosin (Gum)—	**New York, per 100 lbs.**	
E	8.40—	
F	8.40—	
G	8.40—	
WW	8.70—	
Rosin (Wood), carlots,		
F.O.B. South	4.25 to	4.50
Salt Cake—		
Dom. bulk (wks) ton	17.00 to	23.00
Imp. bulks on dock—		
(Atl. ports) ton (Nom.)	**25.00—**	
Soda Ash—		
Bulk (works) cwt.	**1.20—**	
Paper bags, cwt.	1.50—	
Soda (Caustic)—		
Solid drums, cwt.	**3.35 to**	**3.40**
Ground and flake, drums, cwt.	**3.75 to**	**3.85**
Sodium Silicate—		
40 deg. 55 gal. drums,		
(works) cwt.	1.70 to	1.80
40 deg. 35 gal. drums,		
(works), cwt.	1.40 to	1.50
Starch—		
Pearl, 140 lb. bags, cwt.	6.44—	
Pearl, barrels, cwt.	6.44—	
Paper (Sp.) bags, cwt.	6.44—	
Powdered, barrels, cwt.	6.65—	
Sulphur (Crude)		
(Mine) bulk, long ton	21.00 to	22.00
Talc—		
Dom. 100 lb. bags (mine)		
ton	**35.00 to**	**38.00**
Canadian	**35.00 to**	**45.00**
Titanium Dioxide—		
Barium Pig. bbls., lb.	**.21 to**	**.21½**
Calcium Pig. bbls., lb.	**.21 to**	**.21½**
Zinc Sulphide, bbls., lb.	**11.50 to**	**11.75**

WOOD PULP

The following are OPS ceiling prices on domestic wood pulp, dollars per short air dry ton delivered consuming mills including the basic maximum freight allowances as provided:

Bleached sulphite	140.00—
Unbleached sulphite	132.50—
Bleached sulphate	145.00—
Semi-bleached sulphate	140.00—
Unbleached sulphate	132.50
Bleached soda	140.00—
Ground wood	92.50—
Sulphite screenings	72.50—
Sulphate screenings	67.50—
Ground wood screenings	60.00—
Unbleached sulphate sideruns	132.50—
Standard news print sidetun	92.50—

OPS ceiling prices on European wood pulp, dollars per short air dry ton, on dock at American Atlantic ports, follow:

Bleached sulphite	225.00—
Bleached sulphate	230.00—
Unbleached sulphite	200.00—
Unbleached sulphate	200.00—

Current quotations on imported wood pulp, dollars per short air dry ton, on dock American Atlantic ports follow:

Bleach. sulphite, Canadian	150.00—
Bleach. sulphite, Swedish	140.00—
Bleach. sulphite, Norwegian	140.00—
Bleach. sulphite, Finnish	——
Unbl. sulphite, Canadian	——
Unbl. sulphite, Swedish	125.00—
Unbl. sulphite, Finnish	——
Blch. kraft, Canadian	145.00—
Blch. kraft, Swedish	145.00—
Unbl. kraft, Canadian	100.00—
Unbl. kraft, Swedish	115.00—
Unbl. kraft, Finnish	——

PAPER

Boards—

OPS ceiling prices (CPR 108) per ton, delivered consumer's mill, 10 tons or more:

Plain chip	105.00—
News vat lined chip	107.50—
Filled news	110.00—
Solid news	112.50—
White vat lined chip	142.50—
Chip tube and can stock	110.00—
Single manila lined chip	147.50—
Single jute lined chip	145.00—
White patent coated:	
.020	175.00—
.018	177.50—
.016	180.00—

Book Paper—

OPS ceiling prices (CPR 106) per cwt.:

Coated two sides	
70 lb. No. 2 enamel, 25x38-500, trimmed 4 sides	4 cases $17.25 Carloads $16.30
45 lb. enamel, 25x38-500, trimmed 4 sides	4 cases $13.05 Carloads $12.10
Uncoated	
55 lb. No. 2 offset, 25x38-500, trimmed 4 sides	4 cases $14.80 Carloads $13.85
50 lb. A Grade English Finish, 25x38-500, untrimmed	4 cases $14.05 Carloads $13.10
20 lb. envelope, 17x22-500, untrimmed	Carloads $12.40
16 lb. tablet, 17x22-500	Carloads $11.35

Rag Content Bond—

OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

	17 lbs. or heavier	16 lbs.
Extra 100% rag	57.50	58.50
100% rag	49.50	50.50
75% rag	38.00	39.00
50% rag	29.50	30.50
25% rag	24.00	25.00

Rag Content Ledger—

OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

Extra 100% rag	58.50
100% rag	50.50
85% rag	42.00
75% rag	39.50
50% rag	30.50
25% rag	25.00

Sulphite Bond—

OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

	17 lbs. or heavier	16 lbs.
Air dry bond (Watermarked)	20.00	21.00
No. 1 bond (M.F. watermarked)	15.50	16.20
No. 2 bond (M.F. watermarked)	14.90	15.60
Plain bond (M.F. unwatermarked)	14.00	14.60

Sulphite Ledger—

OPS ceiling prices (CPR 91) per cwt., f.o.b. mill:

No. 1, M.F. watermarked	16.50
No. 2, M.F. watermarked	15.90
Plain, M.F. unwatermarked	15.00

Glassine (f.o.b. mill)—

OPS base ceilings (CPR 76):	**per cwt.**
25 lb. base No. 1 bleached glassine	**22.50—**
25 lb. base No. 1 bleached greaseproof	**20.00—**

News—

	per ton
Rolls, Standard (Contract)	116.00 to 126.00
Rolls (Spot)	**(Nominal)**
Sheets	130.00—

Tissues (Carlots)—

	per ream
White No. 1	1.90—
White No. 2	1.60—
Bleached Anti-Tarnish	—
Colored	2.00—
Anti-Tarnish Kraft	1.90—
Manila	2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	**.90—**
Napkins, full crepe and embossed (12½ lb. to M shts.) per cs.	**.90—**
Toilet, Bleached (M shts.) per cs.	10.00—
Toilet, Unbleached (M shts.) per cs.	8.00—

Towels

	per case
Bleached	6.30—
Unbleached	5.90—

Wrappings (Kraft)—

OPS ceilings, per cwt., 50 lb. base weight:	**per cwt.**
Standard wrapping	7.75—
Butchers, counter rolls	8.25—
Standard bag, mill rolls	7.50—
Shipping sack, mill rolls	7.75—
Gumming, mill rolls	8.00—
Asphalting, mill rolls	7.75—
Envelope, mill rolls	9.25—

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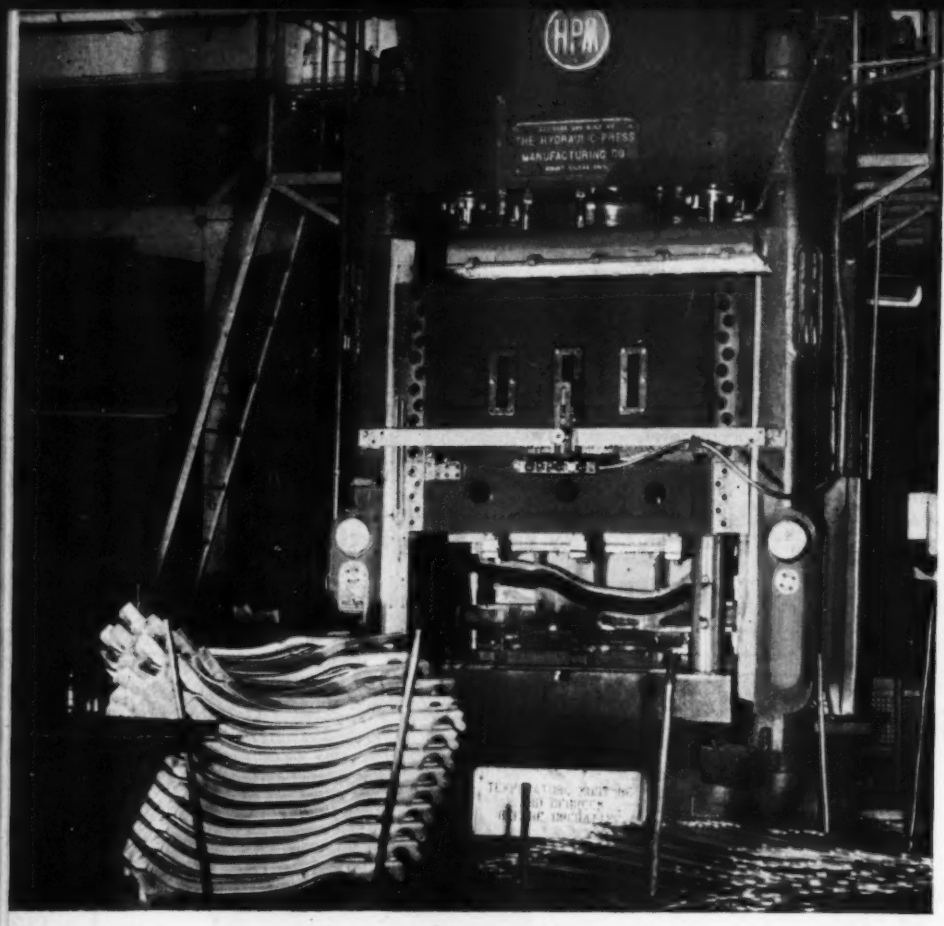

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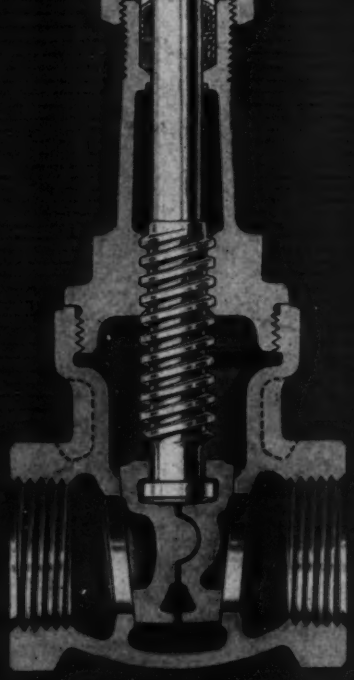

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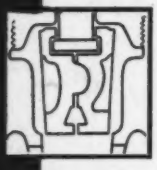

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